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Contribution from the Office of Farm Management and Farm Economics
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FARM MANAGEMENT IN THE OZARK REGION OF MISSOURI.

A STUDY OF THE ORGANIZATION AND OPERATION OF A NUMBER OF REPRESENTATIVE FARMS.

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INTRODUCTION.

This bulletin is based on a study of the organization and management of 79 farms distributed in five counties in the southern and southeastern Ozark region of Missouri. Thirty-one of these farms are representative of the conditions of rolling and hilly upland farms: the other 48 are more representative of the conditions on the valley and level-upland farms. Throughout the bulletin these two classes of farms are treated separately.

Data are presented on size of farms, distribution of farm area, capital, receipts and expenses, and the returns in farm income and labor income. The first part of the bulletin treats of the findings largely from the standpoint of the area as a whole, and the latter part is devoted to the consideration of representative individual farms, with a view of emphasizing some of the outstanding factors contributing to success or failure.

SUMMARY.

Topographical structure to a large extent determines the agricultural value of the land. The southern and eastern Ozark region of Missouri is a mountainous plateau, predominantly rough and rocky,

large areas of which are too rough and stony to admit of cultivation of crops. The areas more adaptable to cultivation have been in farms for many years. As a rule, the operator of a valley or level-upland farm has a decided advantage over the operator of the rough farm.

After deducting from their total receipts the year's operating expenses, including the value of family labor, and allowing 5 per cent interest on the capital invested, the operators of rolling and hilly farms had in 1917 an average labor income of $309, and those operating valley or level-upland farms an average of $646. Of the 79 farms studied, 20 per cent had no labor income after making the above specified deductions from their year's receipts, and 21 per cent had a labor income above $1,000.

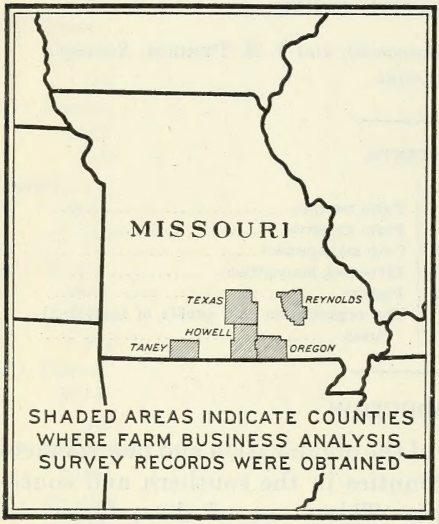

FIG. 1.—Map showing region studied.

Labor incomes earned by typical operators indicate that an operator having much less than 40 acres of crop land for a general live-stock farm has a rather poor chance of attaining financial success. The labor income earned by operators increased as the size of the farm increased.

Live-stock farming is the principal agricultural industry of the region.

The production and sale of cream is a growing branch of the live-stock industry. The use of cows for dairy purposes is increasing. The average production per cow of 78 cows on dairy farms was 142 pounds of butter fat. This industry would become more profitable if cows of greater productive capacity were introduced. The production would also be increased by providing a better balanced feed ration.

Live-stock losses are a source of considerable expense in operating a farm. Losses of live stock on the farms for the year studied were as follows: Cattle, 3.6 per cent; horses and mules, 3.4 per cent; sheep, 8.9 per cent; hogs, 10.7 per cent; goats, 11 per cent.

Pasturage is the foundation of the live-stock industry. The natural pastures can be greatly improved by thinning out woodland areas, keeping the underbrush down, and sowing tame grasses.

For greater assurance of live-stock feeds during the summer droughts, to which this section is liable, many farmers plant sorghum, millet, and kafir corn as auxiliary hay crops. On the better

managed farms silage is also produced for winter feed, and the operators are beginning to use it to supplement the pastures during the summer droughts.

With proper care, alfalfa, clover, soy beans, and cowpeas are grown. The possibilities of these crops both for hay and for grazing are becoming more clearly recognized.

The rotation in most frequent use in this region consists of (1) corn, one or two years, (2) winter wheat or spring oats in which grass is seeded, (3) a hay crop cut for one or two years, and pastured from one to three years.

There are many opportunities to obtain land in the Ozarks. A better understanding by prospective purchasers of the possibilities and limitations of this area should bring greater satisfaction in choosing a farm with a given amount of capital to invest.

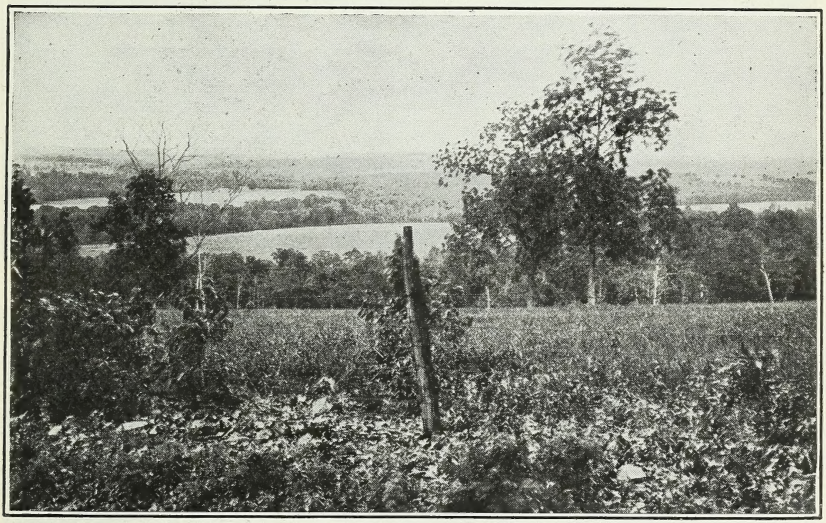

FIG. 2.—Typical Ozark country.

LOCATION AND CHARACTER OF THE AREA.

The Ozark Plateau of Missouri covers the greater part of the State south of the Missouri River. This region is described by the United States Bureau of Soils as an elevated limestone region. (See fig. 2.) The counties represented in this study were Texas, Howell, Oregon, Reynolds, and Taney, in the southern and southeastern parts of the region. In main topographical features and soils they are similar to all of the eastern part.[1]

[1] The U. S. Bureau of Soils, in cooperation with the University of Missouri, made a general survey of the Ozark region of Missouri and Arkansas, results of which are found in the U. S. Department of Agriculture publication, "Soil Reconnoissance of the Ozark Region of Missouri and Arkansas." Separate soil surveys have been made in a number of counties in this region or are now under way. For a detailed description of the soils in any location reference should be made to the proper soil survey report.

As a general statement, it may be said that while the soils of the area are in the main similar, the amount of soil suitable for cultivation varies greatly in the various counties, and in different locations in the same county, because of differences in topography. The changes from one phase of topography and soil to another occur without regularity and with great abruptness. The soils are locally known as "highland" or "upland" soils, and "lowland" or "valley" soils. The highland soils predominate. The lowlands comprise the bottoms and valleys, and their area is very limited. Intermediate between these two primary groupings is a class of land neither highland nor lowland which is known as "bench" land. (See fig. 3.)

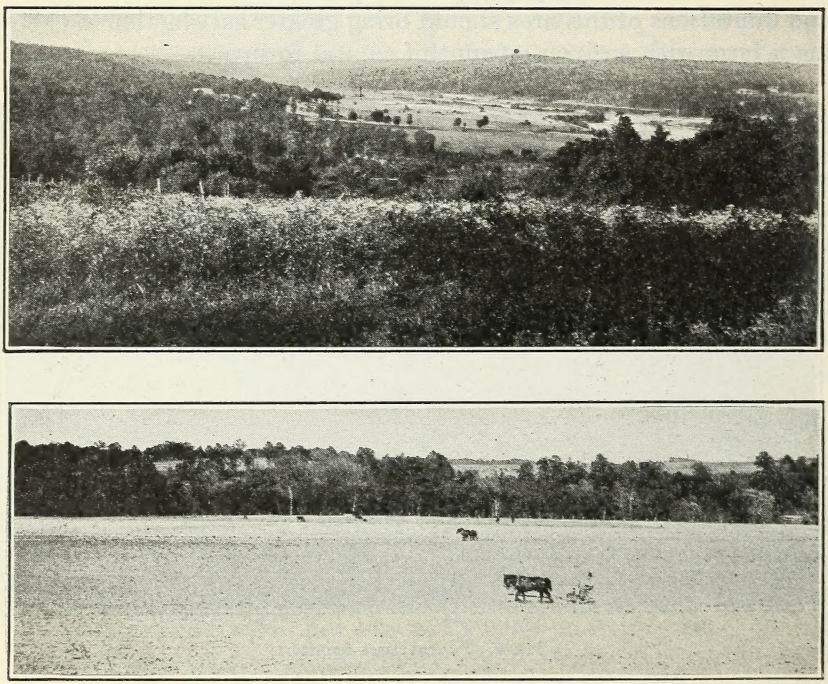

FIG. 3.—Types of Ozark land. In the upper view one looks down from the surrounding hills on a typical river bottom. The lower picture is of a field on what are locally described as "bench" lands.

LOWLANDS.

The "valley" or "bottom" soils of the lowlands vary in character. The best grade of bottom soil occurs in narrow strips along the rivers and creeks. These strips are level and are the best and most fertile farming lands of the region. Their extent, in comparison with the total land area, is very small. The soils locally classed as "valley" lands are, as the name implies, valleys of varying depth, width, and extent, which may be found scattered throughout the entire region. Practically all of the lowlands suitable for cultivation have been in

farms for many years. Of the lowlands the choicest are the bottoms. From this the quality grades down, until in many instances what is described and known locally as valley land is no more desirable than the highlands with a topography sufficiently level to admit of cultivation.

The bench lands, when they occur, are generally in the vicinity of the streams. They lie at a higher altitude than the bottom lands, but are lower than the typical highlands and are usually comparatively

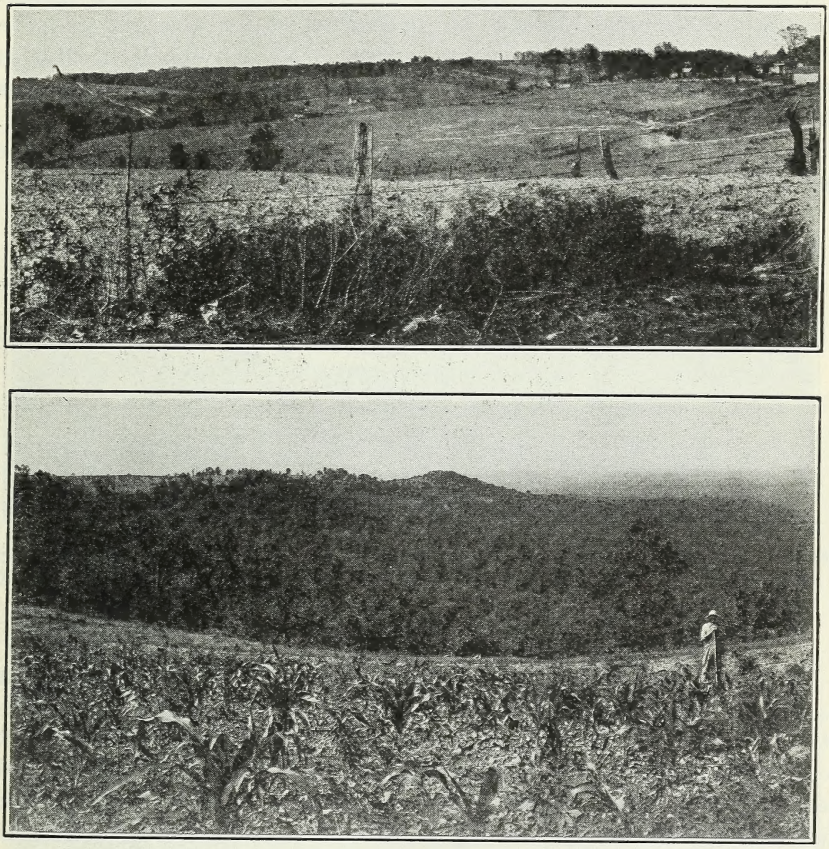

FIG. 4.—Typical phases of Ozark "uplands." The upper view shows the general character of land described in the text as "rolling upland." The lower view is of the more rugged, mountainous country.

level. The area of these lands is small and in point of desirability they class with the valley lands.

HIGHLANDS.

The highlands comprise the great bulk of the land in the Ozark region. A large part of this land, and in some sections the great majority of it, is too rough and stony for cultivation. The topography varies from level to rolling and very steep. (See fig. 4.) In almost

every county level stretches of uplands may be found. These level tracts are the most highly prized of the uplands and from an agricultural standpoint compare favorably with the valleys. (See fig. 5.) Wherever these more level upland tracts are large enough for the establishment of several farms, prosperous communities have been built up, often many miles from a railroad. Very little of the level upland remains uncleared, and the few timbered tracts which are left are scattered and of small area.

In the hilly or rolling uplands of the counties studied farms are found here and there in such places as the original settlers thought could be cleared and farmed to the best advantage. In many places the farms are widely scattered, but in other sections, where the clearing process has been more intensive, farms may be found relatively close together. The greater part of the remaining woodland is probably too rough for profitable cultivation of crops.

FIG. 5.—Type of "level uplands" in the vicinity of Licking, Texas County. Such lands are practically all under cultivation, and prosperous villages will be found near by, though often they are 20 miles from a railroad.

STONES.

Reference has been made to the stony character of this country as a whole. (See fig. 6.) A very small percentage of the area is practically free of stones, and such stone-free ground is almost without exception found in the bottom and in the level-upland soils. The amount of stone is variable. Large areas may be found of solid rock with only a very thin covering of soil. It is evident that such areas can never be of much agricultural value. Very large areas have broken stone of varying sizes and amounts incorporated with the soil. The quantity of such broken stone may be so great that it appears to cover the ground completely. Cultivating such soil entails very hard labor. Where the quantity of stones is sufficient to interfere seriously with cultivation, some farmers make it a practice to remove them. To clear the soil entirely of stones this work has to be done repeatedly for several years, as each plowing brings more stones to the surface. This is a laborious operation, but one which

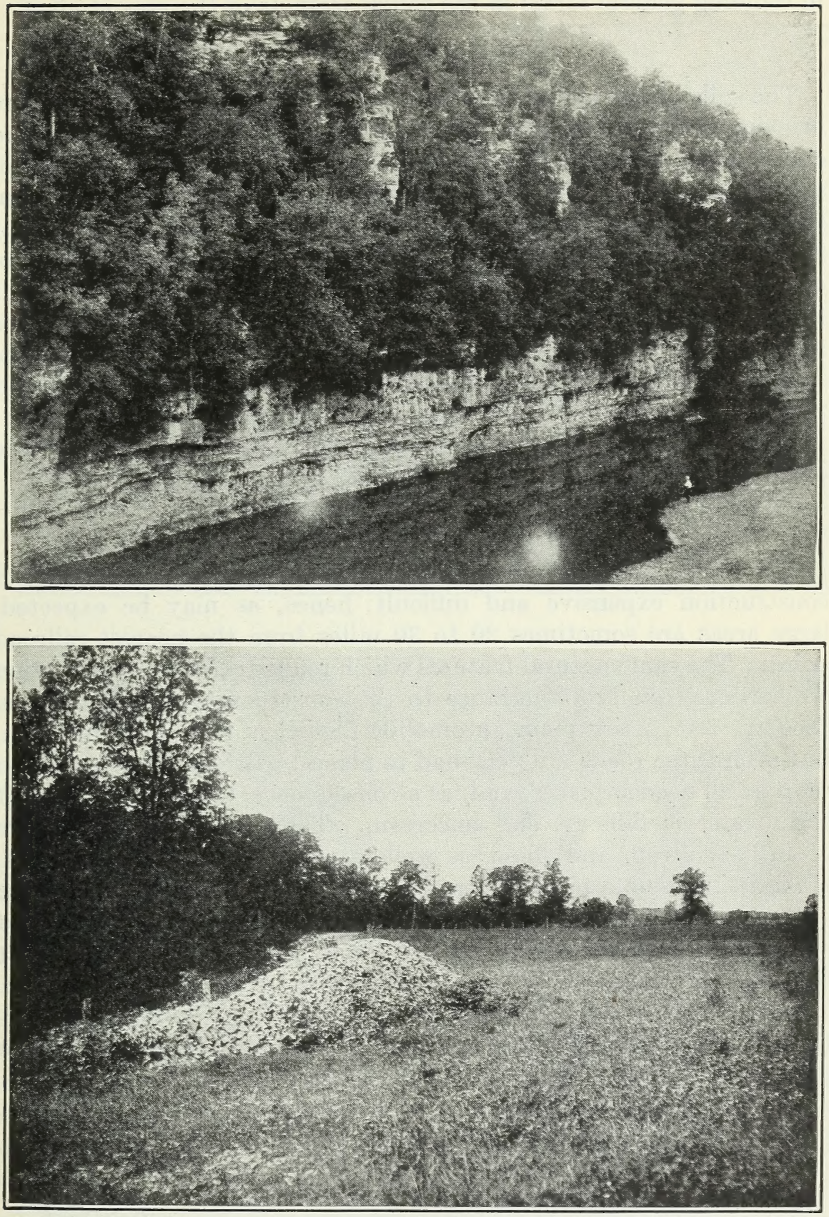

FIG. 6.—Much of the Ozark country, as illustrated in the upper picture, is underlain by solid rock. Such land, when the rock comes to the surface, is obviously of small agricultural value. Stones of varying sizes are found on practically all lands in the Ozarks. The lower picture shows part of the stones gathered in clearing a field of obstructions to the plow.

is generally practiced by those farmers who have been most successful in building general farms in the rough sections of the area studied.

FERTILITY OF THE SOILS.

The soils of the region, with the exception of the bottom soils, are principally stony and gravelly silts and stony and gravelly silt and clay loams. They are usually porous, owing to the large content of stone and gravel. As a result, air and water circulate through them freely, and when they are put under cultivation the humus content is quickly lost, unless a system of farming is adopted in which provision is made for the systematic replenishment of the supply. If the humus content is lost the water-holding capacity of these soils is greatly reduced, and as a result crops suffer severely during the summer droughts, to which this section seems peculiarly liable, and profitable crop production is then almost an impossibility.

There is a wide variation in the natural fertility and productivity of the soils throughout the area.

TRANSPORTATION FACILITIES.

The rough, hilly, broken character of the region makes railroad construction expensive and difficult; hence, as may be expected, large areas are sometimes 20 to 30 miles from the nearest railroad point. The same natural features which render railroad construction difficult are equally a hindrance to the construction of public roads. (See fig. 7.) A few main automobile highways traverse the region, but even these roads are very bad in places. Bridges have not been built at all needed places, and, as a consequence, travel in a season of high water is difficult and uncertain. The grades, moreover, are often very steep, and these, as well as the gravelly creek bottoms, make it impossible to haul very heavy loads. For farmers who are situated off these main highways and at a distance from a railroad point, the transportation question is rather difficult, for hauling must be done over stony and badly washed roads, often steep and rough.

Increasing attention is being given the roads in this section, particularly the system of main roads, and it is planned to improve the grading of the roads already established, and to build more through and connecting roads. Some of the towns situated several miles from a railroad point have motor truck freight services in operation.

CLIMATE.

This area is just north of the line indicating the northern limit of profitable cotton production, and within the winter wheat territory. The winters are fairly mild, a number of the residents of these counties having come from regions farther north to escape the rigors of the severer winters. The averages of the mean temperatures

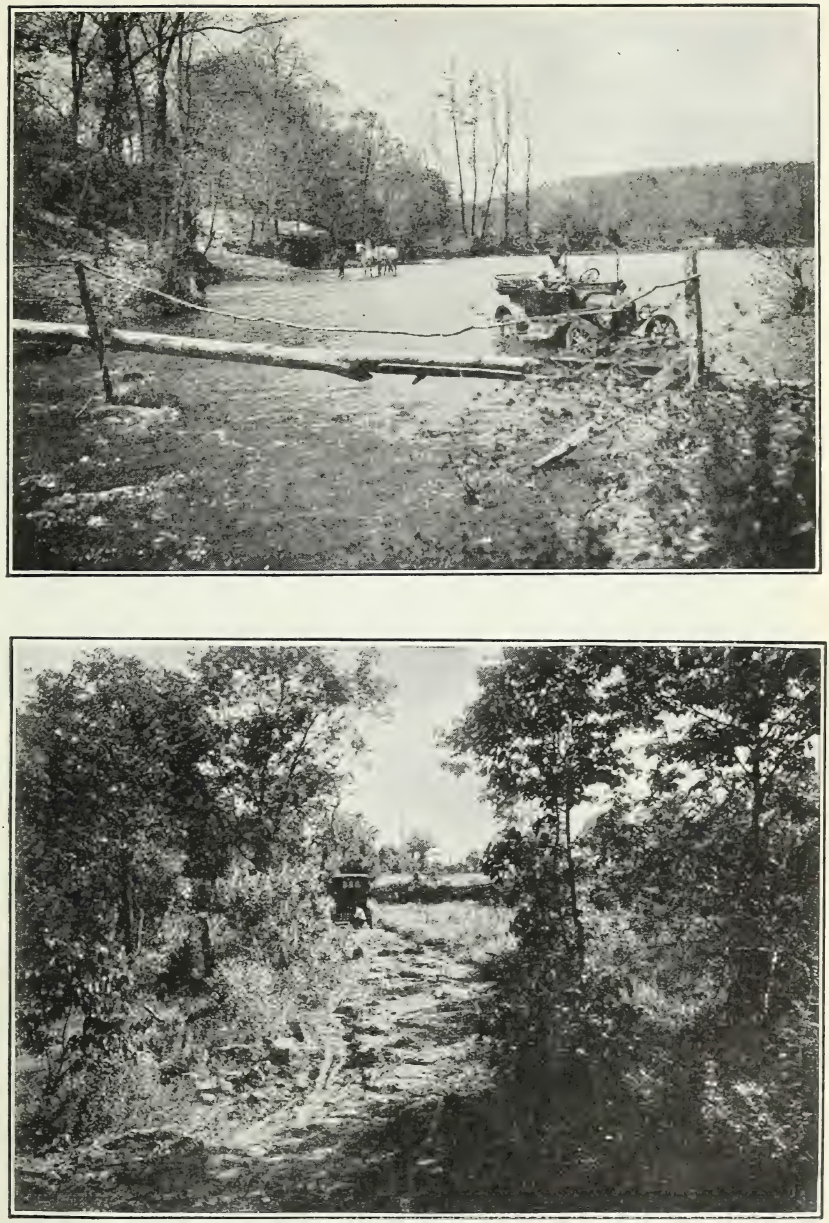

FIG. 7.—Difficulties of transportation. The stream in the upper picture can be forded during dry seasons, but during high water the passage could be effected only with difficulty. The lower picture shows a very rough road, broken by outcropping rocks and stone ledges.

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recorded at Houston, Springfield, and Koshkonong are as follows: Winter, 34.5 degrees; spring, 56.1 degrees; summer, 75.4 degrees; fall, 58.8 degrees; annual, 56.2 degrees. The area is subject to sudden changes in temperature, summer temperatures of 83 degrees, 84 degrees, and 86 degrees, respectively, having been recorded at these stations as early as February, while freezing temperatures have been recorded as late as May. Periods of warm growing weather in the spring which caused the sap to rise in dormant vegetation, followed by freezing weather, have been very disastrous to such fruit crops as peaches, and both fruit buds and trees have frequently been killed.

As recorded at five stations, viz, Houston, Mountain Grove, Birchtree, Springfield, and Koshkonong, the average date of occurrence of the last killing frost in spring is April 12. In the northern part of the area, at Houston, the average date is April 20; in the southern part, at Koshkonong, it is April 5. The average date of occurrence of the first killing frost in fall as recorded at these five stations is October 20. The records kept at these stations show the average of the number of days in the growing season to be 183.

The difference of one degree in latitude between the northern and southern parts of the area results in a difference of 26 days in the average growing season. Thus, in the lower part of the area spring vegetation and grass begin to grow two or three weeks earlier than in the northern part, and, consequently, cattle can be turned on pasture about two weeks earlier. The grazing period in the fall is also longer for the southern area than for the northern; the value of this, however, is not so great as the earlier grazing in the spring.

RAINFALL.

The rainfall at the five stations, Houston, Mountain Grove, Birchtree, Springfield, and Koshkonong, would seem to indicate an abundance of rain, the average in inches being as follows: Winter, 7.97; spring, 12.93; summer, 13.29; fall, 8.88; annual, 43.07. It is seldom, however, that the average rainfall and distribution is recorded in any particular year. The spring and summer rainfall is the most vital, and the distribution of the rainfall is a factor equal in importance to the amount.

The year 1917 was commonly reported as a year favorable to crop production, but all farmers interviewed were unanimous in reporting that for a number of years prior to 1917 this region was visited by disastrous droughts with great resulting damage to crops, especially corn, and to pasture. Precipitation records bear out this statement. The records kept at the five stations above mentioned show their average rainfall for 1917 to have been 41.7 inches, or within 2 inches of the average annual rainfall for the region. The distribution was

also equally favorable, the average precipitation in inches recorded at these five stations for the five vital spring and summer months being as follows: April, 7.41; May, 3.68; June, 4.74; July, 4.41; and August, 5.75.

The monthly precipitation records at Springfield for 40 years, 1877–1916, inclusive (records for the year 1881 not available), show that 17 of the 40 were years which may be called drought years; that is, years in which a rainfall of less than 2 inches fell in one or more of the five months, April to August, inclusive, and that 11 times in the 40 years two consecutive months, of the five-month period, April to August, passed with a total rainfall of less than 5 inches. (See fig. 8.)

FIG. 8.—An artificial pond in the Ozark uplands. Getting water for live stock is frequently a serious problem in sections of the Ozarks, and artificial ponds or reservoirs are often resorted to for furnishing a suppiy. In periods of severe drought these frequently go dry. It then becomes necessary to drive the stock long distances to a spring creek or to sink a deep well.

Dividing this period into four 10-year periods, the frequency of occurrence of these years of drought in each period follows:

Frequency of occurrence of years of drought.

Item.	1877–1886	1887–1896	1897–1906	1907–1916	1877–1916
Number of years in which less than 2 inches of rain fell in one or more of the months April to August, inclusive	2	5	3	7	17
Number of years in which less than 5 inches of rain fell in 2 consecutive months during the months April to August, inclusive	2	2	3	4	11

It is seen that during the four periods of 10 years each for which weather records are available the years in which there was a marked deficiency of rainfall were much fewer in each of the three preceding 10-year periods than in the last 10-year period. We may therefore infer that in any period of 10 years at least two and probably more years may be expected in which drought conditions will obtain more or less, and crop production suffer accordingly.

FARM BUSINESS AND INCOME.

The farms surveyed were classed in one of two divisions, based upon considerations of soil and topography. The first of the divisions comprises the farms located on rolling uplands, hills, and ridges, and these will be referred to in the following text as "rolling and hilly" farms. The second includes those located on the creek bottoms, valleys, bench lands, and level uplands, and these will be referred to as "valley and level-upland" farms. The farms in the first division are operated under difficulties of varying proportions due to topography and the presence of stones; the farms in the second division are in the main fairly level and free from stone. Practically every farm studied in this region included an acreage of rough woodland, and in most instances the greater part of this woodland can never be utilized economically for cultivation.

In Table I is shown by classes the size of farm, acres of crops, capital, receipts, expenses, and income for rolling and hilly farms and valley and level-upland farms, for the year 1917. The table furnishes a measure of the relative importance of the size of farm, capital, receipts, and expenses for the farms when grouped according to the number of acres devoted to crops. The rolling and hilly upland farms were placed in two groups, those with 40 acres or under in crops and those with over 40 acres in crops. The average size of the farms in the smaller-size group was 128 acres, with 26 acres in crops and $3,832 capital, while the larger-size group averaged 240 acres per farm with 72 acres of crops and $7,133 capital.

The valley and level upland farms showed a wide range in size, and were placed in three groups, namely, those with 40 acres or under in crops, those with from 40 to 70 acres, and those with over 70 acres. The farms with 40 acres or under in crops averaged 29 acres in crops and had an investment of $4,631 per farm. Those with from 40 to 70 acres in crops averaged 52 acres in crops and an investment of $8,937. Those with 70 acres or more in crops averaged 105 acres in crops and an investment of $12,602.

FARM INCOME AND LABOR INCOME.

The farm income represents the difference between the gross income and the expenses. As the farmer's time is not included in the expenses of the farm, his earnings are included in the income figure. The earnings of the capital invested in the farm business are also included in this figure. To separate the two and arrive at the earnings of the farmer due to his work and supervision, interest at the rate of 5 per cent on the capital invested has been allowed as the earnings due to the capital in the business, and the remainder of the farm income is considered to represent the farmer's cash earnings for

his year's work, called the farmer's labor income. In addition to the labor income the farmer has the use of a house, and the food and fuel furnished the family by the farm. The farmer's labor income, to a certain degree, measures the relative efficiency with which the farm is managed.

The family income represents the amount that is left from the total farm receipts for the use of the family after deducting the year's farm expenses excluding value of family labor, and including interest paid on indebtedness. The family income on the rolling and hilly farms averages $759, and on the valley and level-upland farms $1,331. This represents the amount available to these families, on the average, for living expenses and savings.

The labor income as reported does not include the value of farm products used for home consumption. While the values of farm-furnished supplies toward the family living were not ascertained upon these farms, it was evident that these represented a considerable item. Wheat and corn raised on the farm furnished practically all of the bread and cereals. Hogs butchered for home consumption furnished a large portion of the meat consumed. A large amount of poultry and eggs and dairy products was likewise used, and practically every farm provided potatoes, garden vegetables, and some fruit and sirup for the home.

A study of 950 farms in 14 areas for the years 1913 and 1914,[1] showed an average value of food, fuel, and house rent furnished the farm family by the farm of $423 per farm, or $90 per person. Of this amount, $260, or $55 per person, was for food, $31, or $7 per person, was for fuel, and $132, or $28 per person, was for house rent. Thus a farmer with a relatively small labor income can maintain a plane of living comparable with that of the city man who earns a considerably larger salary.

The average labor income and farm income for valley farms are considerably higher than for the hill farms, as might be expected. For the small-farm group of the hilly farms shown in Table I the average farm income was found to be $357, and for the larger-farm group $819, with an average for all of $580; the average labor income was $165, $462, and $309, respectively. Similarly, for the valley farms shown in this table, the average farm income was $436, $1,038, and $1,707 for the three size-groups, and the average labor income $204, $591, and $1,077, respectively. Every condition for the year which the records cover was favorable to a good labor income for the operators. The seasons had been good, with good crops and pasture and a good acorn and mast crop. The price of every article sold from the farm was higher than in previous years. Farm expenses

[1] U. S. Department of Agriculture Bulletin 410, "Value to Farm Families of Food, Fuel, and Use of House."

were higher also, but farmers expressed the feeling that increase in income more than compensated for the increased expenses. Even at this, however, the income of the majority of these farmers was none too large to meet a satisfactory standard of living.

The operation of a general farm with much less than 40 acres of land for crops is exceedingly unsatisfactory, regardless of the location of the farm, whether among the valleys or among the hills. Size of business is an important factor in farming throughout this area, but it is also true that the limit to the number of acres of crops which can be profitably included in one farm by the average operator is reached more quickly with farms of rough and stony character than in the case of farms with land more easily cultivated, and perhaps this limit has been reached by some of the larger hill farms.

The hand work involved in making a profit in farming on the poorer of the lands in this region is not generally recognized. Much of the land throughout the area changes hands often, and many of those who purchase such farms, especially those who try to operate small farms with limited capital, must face a most difficult economic problem.

TABLE I.—*Summary of the farm business on 31 rolling and hilly farms and 48 valley and level-upland farms, Ozark region, Missouri, 1917.*

Item.	Rolling and hilly farms.			Valley and level-upland farms.			
	Under 40 crop acres (16 farms).	40 crop acres and over (15 farms).	All farms (31).	Under 40 crop acres (12 farms).	40 to 70 crop acres (21 farms).	70 crop acres and over (15 farms).	All farms (48).
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Farm area	128.3	239.7	182.1	113.8	206.0	329.8	221.7
Crop area	26.4	71.8	48.3	29.1	52.4	105.2	63.1
Improved pasture area	19.4	33.9	26.4	23.6	48.6	76.6	51.1
Woods fenced	40.4	68.7	54.1	23.7	24.1	97.9	47.1
Waste and woodland area	41.3	64.4	52.5	33.2	76.7	46.9	56.5
Rented out area	.8	.9	.8	4.2	4.2	3.2	3.9
Capital	$3,832	$7,133	$5,430	$4,631	$8,937	$12,602	$9,006
Receipts	617	1,618	1,101	850	1,708	2,887	1,861
Expenses	260	799	521	414	670	1,180	765
Farm income	357	819	580	436	1,038	1,707	1,096
Interest on investment at 5 per cent	192	357	271	232	447	630	450
Labor income	165	462	309	204	591	1,077	646
Operator's labor	358	521	435	373	455	483	444
Farm income	357	819	580	436	1,038	1,707	1,096
Value of unpaid family labor	82	351	212	205	248	377	278
Interest on indebtedness	37	29	33	27	33	69	43
Family income	402	1,141	759	614	1,253	2,015	1,331
Per cent return on capital	0.03	4.2	2.7	1.4	6 5	9.7	7.2

The Ozarks offer certain limited opportunities of acquiring land upon which profitable farming may be carried on. Conditions, however, are so varied, and, usually, so unlike those to which the average newcomer to the Ozarks is accustomed, that no stranger should attempt to buy a farm without first making a careful examination

of the property himself, and acquainting himself fully with the conditions under which his operations will have to be carried on. If prospective purchasers before selecting a given farm would acquire a more intimate knowledge of these lands and their agricultural possibilities and limitations, they would take an important step toward putting the agriculture in many of these areas upon a more stable and satisfactory basis.

FARM INVESTMENT.

The investment of these farms consists of the value of the land and buildings, of live stock, of machinery used in operating the farm, and of feed and supplies on hand, together with the cash needed for meeting current expenses before farm receipts are sufficient to meet operating expenses. Table II shows the distribution of capital for the various size-groups of hill and valley farms. The investment in land and buildings constitutes the major part of the capital. Next in order of importance come live stock, machinery, cash for operation, and feed supplies.

REAL ESTATE.

The real estate investment—the value of land and improvements—averages $3,701 for the hilly farms and $6,539 for the valley farms. The better buildings are on the valley farms. Real estate averaged in value $20 per acre for the hilly and $30 per acre for the bottom and level upland farms.

The value of the land was estimated on the basis of the entire farm with buildings and improvements. The average per acre of the groups of farms with a small, medium, and large area of crops per farm follows:

Value of real estate.

Class of farm.	Small farms.	Medium-sized farms.	Large farms.	All farms.
Rolling and hilly farms	$23	$20	$18	$20
Valley and level-upland farms	35	32	26	30

LIVE STOCK.

About one-fifth of the capital of these farms is invested in live stock. Almost universally the farmers in this region follow some branch of the live-stock industry. In the case of the larger farms, the investment in live stock at the beginning of the year does not give a correct measure of the proportion of capital used in the live-stock industry, for the reason that in the case of the hill farms the live-stock business is mainly restricted to the stock on hand and the increase, whereas in the case of the large bottom farms a considerable portion of the cash to run farms is used in buying and feeding additional live stock.

MACHINERY.

The machinery investment usually covers equipment for a combination of grain and live-stock farming. For the grain crops, binders and drills are needed, and for the live stock many of the farmers are putting in silos, which necessitates gasoline engines and cutters. These expensive items of equipment are to some degree purchased cooperatively, but frequently a farmer is so far from his nearest neighbor with similar requirements that he is forced to buy them individually.

FEED AND SUPPLIES.

The item of feed and supplies covers feeds and farm supplies on hand at the beginning of the farm year, which for this survey was the spring of 1917. The year 1916 had been unfavorable to the production of crops in this region, and most of the feed raised had been fed during the winter. Few farmers had more feed on hand than was necessary to feed their work stock until the 1917 harvest. Many were depending entirely on pasture, together with small pur-

FIG. 9.—Red clover, as it grows on "level upland." In point of desirability these lands class with the "valley" lands.

chases of grain concentrates, to eke out until the oat crop was ready to feed. The crop year 1917 was favorable, thereby enabling the farmers to carry sufficient feed and supplies for the following spring feeding without the purchase of as much feed as was necessary the previous year.

CASH TO RUN THE FARM.

The average amount of cash reported by the operator as on hand during the year to meet farm expenses increases regularly as the size of farm increases. The large amount reported for the largest-size group of valley and bottom farms is due to the fact that the buying and feeding of stock is practiced by these farmers. In some instances a bunch of feeder cattle or hogs may be bought and carried through

the feeding period; in others, stock cattle and hogs from the range are bought as offered for sale and put in shape for the market.

TABLE II.—*Distribution of capital on 31 rolling and hilly farms, and 48 valley and level-upland farms, Ozark region, Missouri.*

Item.	Rolling and hilly.					
	Under 40 crop acres (16 farms).		40 crop acres and over (15 farms).		All farms (31).	
	Investment.	Per cent.	Investment.	Per cent.	Investment.	Per cent.
Land	$2,152	56.2	$3,459	48.5	$2,784	51.2
Dwelling	522	13.6	634	8.9	576	10.6
Other buildings	214	5.6	476	6.6	341	6.3
Live stock	684	17.8	1,678	23.5	1,165	21.5
Machinery	138	3.6	499	7.0	313	5.8
Feed and supplies	24	.6	97	1.4	60	1.1
Cash	98	2.6	290	4.1	191	3.5
Total capital	3,832	100.0	7,133	100.0	5,430	100.0

Item.	Valley and level upland.							
	Under 40 crop acres (12 farms).		40 to 70 crop acres (21 farms).		70 crop acres and over (15 farms).		All farms (48).	
	Investment.	Per cent.	Investment.	Per cent.	Investment.	Per cent.	Investment.	Per cent.
Land	$2,614	56.5	$5,099	57.1	$6,819	54.1	$5,015	55.7
Dwelling	548	11.8	960	10.7	980	7.8	863	9.6
Other buildings	280	6.0	627	7.0	1,011	8.0	661	7.3
Live stock	814	17.6	1,460	16.3	2,023	16.0	1,475	16.4
Machinery	225	4.8	484	5.4	541	4.3	437	4.8
Feed and supplies	31	.7	77	.9	71	.6	63	.7
Cash	119	2.6	230	2.6	1,157	9.2	492	5.5
Total capital	4,631	100.0	8,937	100.0	12,602	100.0	9,006	100.0

CROPS.

The list of crops in Table III shows the utilization of the crop land. The cropping system which is followed in a general way, by the majority of the farmers in this region, consists of (1) corn for one or two years, (2) wheat or oats, and (3) timothy and clover cut for hay as long as the stand remains good, and then pastured from one to three years. (See fig. 9.) In point of acreage corn occupies first place, followed in the order named by hay, wheat, and oats. About one-third of the crop area is in corn and one-fourth in mixed hay.

TABLE III.—*Distribution of crop area on 31 rolling and hilly farms and 48 valley and level-upland farms, Ozark region, Missouri.*

Crop.	Rolling and hilly farms.					
	Less than 40 crop acres (16 farms).		40 crop acres and over (15 farms).		All farms (31).	
	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.
Corn	10.6	40.2	21.9	30.5	16.1	33.4
Wheat	.8	3.0	9.2	12.8	4.8	10.0
Oats	.7	2.6	3.9	5.4	2.2	4.6
Rye	1.3	4.9	.4	.6	.9	1.9
Mixed hay	4.3	16.3	21.2	29.5	12.5	25.9
Alfalfa, soy-bean and cowpea hay	.7	2.6	4.7	6.6	2.6	5.4
Other hay	2.7	10.2	5.9	8.2	4.2	8.7
Apples and peaches	2.1	8.0	3.6	5.0	2.8	5.8
Other crops	4.0	15.2	4.3	6.0	4.1	8.5
Double cropped	(.8)	(3.0)	(3.3)	(4.6)	(2.0)	(4.2)
Total	26.4	100.0	71.8	100.0	48.2	100.0

Crop.	Valley and level-upland farms.							
	Less than 40 crop acres (12 farms).		40 to 70 crop acres, (21 farms).		70 crop acres and over (15 farms).		All farms (48).	
	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.
Corn	15.2	52.2	16.7	31.9	35.5	33.8	22.2	35.2
Wheat	2.7	9.3	7.2	13.7	20.1	19.1	10.1	16.0
Oats	2.7	9.3	4.1	7.8	9.6	9.1	5.5	8.7
Rye	.5	1.7	1.1	2.1	3.0	2.9	1.5	2.4
Mixed hay	3.8	13.0	15.9	30.4	29.2	27.8	17.0	26.9
Alfalfa, soy-bean and cowpea hay			2.4	4.6	2.2	2.1	1.8	2.9
Other hay	2.2	7.6	3.5	6.7	3.2	3.0	3.1	4.9
Apples and peaches	2.1	7.2	2.1	4.0	3.4	3.2	2.5	3.9
Other crops	1.3	4.5	1.8	3.4	1.2	1.1	1.5	2.4
Double cropped	(1.4)	(4.8)	(2.4)	(4.6)	(2.2)	(2.1)	(2.1)	(3.3)
Total	29.1	100.0	52.4	100.0	105.2	100.0	63.1	100.0

Alfalfa was grown by a few farmers, not in all cases with success. Soy beans were grown by only a few farmers, as a hay crop or in corn for silage. Only a few acres of cowpeas were planted in the area. A few acres of kafir corn, millet, sorghum, or oats for hay were grown by a majority of the farmers as auxiliary hay crops. These crops are designated in the table as "Other hay." On practically every farm an acreage was devoted to apples. These, however, on most of the farms are receiving little attention and the trees are dying out, the orchards being used for the production of other crops or for pasture. Peaches, likewise, have been unsatisfactory and are not being replanted. "Other crops" in the table includes potatoes, sorghum for sirup, sweet potatoes, cotton, field beans, blackberries, strawber-

ries, pears, cherries, milo maize, buckwheat, rape, spelt, Egyptian wheat, and broom corn grown, more or less, in small acreages. Potatoes were found on most of the farms, and so also was sorghum for sirup, practically every farm having a small acreage of these two crops for home use, the amount raised in excess of home requirements being disposed of on local markets. Double cropping is not practiced to any considerable extent.

The yields obtained during the year of the survey were normal for a good season.

PASTURE.

While the free range still furnishes the greater part of the pasture, increasing attention is being given to pasture on the farm. Pasture on the farm consists of crop land pastured according to the rotation outlined above, and fenced woods and other land not suitable for crops on which pasture grasses have been planted or the growth of the native grasses encouraged. The farm area pastured does not furnish a measure of the pasture utilized by the farms, for the reason that practically every operator to a greater or less degree utilized the pasturage on the range in addition to his farm pasturage.

CROP PRODUCTION AND YIELDS.

In Table IV are shown the yields per acre and the production and sales of the more important crops per farm. On the hilly farms a small amount of a number of crops are sold, while on the valley and level-upland farms most of the crop sales are from corn and wheat. The yields are considerably better on the valley farms.

TABLE IV.— *Yield per acre and amount and value of sales of crops reported by operators of farms from which records were obtained.*

Crop.	Rolling and hilly farms (31 farms).				Valley and level-upland farms (48 farms).			
	Yield per acre.	Total production per farm.	Sales per farm.		Yield per acre.	Total production per farm.	Sales per farm.	
			Amount.	Value.			Amount.	Value.
Corn for grain.....bushels..	23	358	22	$23	32	667	65	$89
Wheat.....do....	10	50	16	36	12	123	87	175
Rye.....do....	8	6	2	3	17	24	8	9
Oats.....do....	24	51	8	6	25	128	15	11
Timothy and clover.....tons..	.6	8.3	.2	2	.7	12	1	18
Sorghum sirup.....gallons..	58	32	13	12	94	19	10	7
Miscellaneous.....	.....	.....	.....	46	.....	.....	.....	24
Apples.....	.....	.....	.....	26	.....	.....	.....	.....
Field beans.....bushels..	7	3	3	17	.....	.....	.....	.....
Total.....	.....	.....	.....	171	.....	.....	.....	333

FARM RECEIPTS.

The greater part of the income of this territory, as shown in Table V, is contributed by the live stock. In the upland division, live stock produced 66.3 per cent of the average receipts for all farms. It is seen that, regardless of character of land operated, the region as a whole is dependent upon live stock for the greater part of its income. Over 30 per cent of the income is from cattle and dairy products, 18 per cent from hogs, 16 per cent from crops, and the rest distributed in small proportions among a number of items.

TABLE V.—*Distribution of receipts on 31 rolling and hilly farms and 48 valley and level-upland farms, Ozark region, Missouri.*

Crop.	Rolling and hilly.					
	Under 40 crop acres (16 farms).		40 crop acres and over (15 farms).		All farms (31).	
	Receipts.	Per cent.	Receipts.	Per cent.	Receipts.	Per cent.
Crops	$107	17.3	$240	14.8	$171	15.5
Dairy products	48	7.8	110	6.8	78	7.1
Cattle	154	25.0	390	24.1	268	24.3
Horses and mules	38	6.2	82	5.1	59	5.4
Sheep and goats	13	2.1	84	5.2	47	4.3
Hogs	112	18.1	304	18.8	205	18.6
Poultry	46	7.4	101	6.2	73	6.6
Miscellaneous	54	8.8	41	2.5	48	4.4
Increase feed and supplies	45	7.3	266	16.5	152	13.8
Total	617	100.0	1,618	100.0	1,101	100.0

Crop.	Valley and level.							
	Under 40 crop acres (12 farms).		40 to 70 crop acres (21 farms).		70 crop acres and over (15 farms).		All farms (48).	
	Receipts.	Per cent.	Receipts.	Per cent.	Receipts.	Per cent.	Receipts.	Per cent.
Crops	$149	17.5	$214	12.5	$646	22.4	$333	17.9
Dairy products	45	5.3	246	14.4	74	2.6	142	7.6
Cattle	207	24.4	450	26.3	828	28.7	507	27.3
Horses and mules	55	6.5	92	5.4	120	4.2	91	4.9
Sheep and goats	8	.9	82	4.8	111	3.8	72	3.9
Hogs	136	16.0	226	13.2	623	21.5	328	17.6
Poultry	84	9.9	158	9.3	83	2.9	116	6.2
Miscellaneous	48	5.6	36	2.1	26	.9	36	1.9
Increase feed and supplies	118	13.9	204	12.0	376	13.0	236	12.7
Total	850	100.0	1,708	100.0	2,887	100.0	1,861	100.0

FARM EXPENSES.

Table VI gives the distribution of expenses on the various size-groups of farms. The largest expense item is that for labor, which is performed mostly by members of the operator's family. The value of the operator's own labor is not charged in the farm expenses. The farms are operated on as close and economical a basis as it seems possible to do. This, indeed, in the majority of cases is an absolute

necessity. Expenses included in "other expense" in the table are such as feed grinding, horse-shoeing, breeding fees, veterinary fees, stock medicine, twine, thrashing, other machine work hired, and similar small miscellaneous items.

TABLE VI.—*Distribution of expenses on 31 rolling and hilly farms and 48 valley and level-upland farms, Ozark region, Missouri.*

Crop.	Rolling and hilly farms.					
	Under 40 crop acres (16 farms).		40 crop acres and over (15 farms).		All farms (31).	
	Expenses.	Per cent.	Expenses.	Per cent.	Expenses.	Per cent.
Hired labor	$6	2.3	$83	10.4	$43	8.2
Family labor	82	31.5	351	43.9	212	40.7
Repairs, machinery	9	3.5	26	3.3	17	3.3
Repairs, buildings and fences	16	6.2	43	5.4	29	5.6
Feed bought	50	19.2	64	8.0	57	10.9
Seed bought	15	5.8	40	5.0	27	5.2
Fertilizer bought	1	.4	18	2.3	9	1.7
Other expenses	45	17.3	93	11.6	69	13.3
Depreciation on machinery and buildings	36	13.8	81	10.1	58	11.1
Total	260	100.0	799	100.0	521	100.0

Crop.	Valley and level.							
	Under 40 crop acres (12 farms).		40 to 70 crop acres (21 farms).		70 crop acres and over (15 farms).		All farms (48).	
	Expenses.	Per cent.	Expenses.	Per cent.	Expenses.	Per cent.	Expenses.	Per cent.
Hired labor	$22	5.3	$61	9.1	$286	24.2	$121	15.8
Family labor	205	49.5	248	37.0	377	32.0	278	36.3
Repairs, machinery	12	2.9	21	3.1	35	3.0	23	3.0
Repairs, buildings and fences	25	6.0	36	5.4	69	5.9	44	5.8
Feed bought	29	7.0	79	11.8	56	4.7	59	7.7
Seed bought	11	2.7	31	4.6	43	3.6	30	3.9
Fertilizer bought	9	2.2	12	1.8	19	1.6	13	1.7
Other expenses	56	13.5	96	14.3	190	16.1	115	15.1
Depreciation on machinery and buildings	45	10.9	86	12.9	105	8.9	82	10.7
Total	414	100.0	670	100.0	1,180	100.0	765	100.0

During the year covered by the records it was not necessary for the Ozark farmers to buy a great amount of feed, that purchased consisting mainly of concentrates for winter feeding and feed bought in the early spring to carry stock until the harvest. However, in drought years the purchase of feed becomes a necessary and heavy expense, the only alternative being to sell the stock, and many farmers who live long distances from a shipping point have sometimes found it necessary to do this.

CROP MANAGEMENT.

More records were obtained of farms having a small number of acres cropped than of farms having a large number. Among the upland farms in this region there seem to be many more small than large farms, largely because of the topography and the limited financial means of many of the operators. The labor incomes earned indicate that the operators of the large farms have an increasing advantage over the operators of small farms. In Table VII is shown the acreage on the various farms devoted to growing different crops. On all the farms, of course, the topography and the stone content of the soil, as well as the scarcity of labor, influence the number of acres that can be devoted to crops. From this table it is seen that the farms having under 40 acres of crops had considerably smaller acreage devoted to each of the various crops than did the farms having a larger area of land cropped.

TABLE VII.—*Number of farms reporting major crops, by acreages grown.*

ROLLING AND HILLY FARMS.

Number of acres reported.	Farms having under 40 acres of cropped land.					Farms having over 40 acres of cropped land.					All farms reporting.				
	Corn.	Wheat.	Oats.	Meadow hay.	Kafir, millet, and sorghum hay.	Corn.	Wheat.	Oats.	Meadow hay.	Kafir, millet, and sorghum hay.	Corn.	Wheat.	Oats.	Meadow hay.	Kafir, millet, and sorghum hay.
None	2	14	11	8	7	....	4	5	3	4	2	18	16	11	11
1–5	2	1	5	3	6	....	....	6	....	6	2	1	11	3	12
6–10	3	1	....	1	3	....	4	4	1	2	3	5	4	2	5
11–15	5	....	....	3	.....	3	4	....	4	2	8	4	....	7	2
16–20	4	....	....	1	.....	5	3	....	1	.....	9	3	....	2	.....
21–25	....	....	....	....	.....	6	....	....	2	1	6	....	....	2	1
26–30	....	....	....	....	.....	1	....	....	....	.....	1	....	....	....	.....
31–35	....	....	....	....	.....	1	....	....	....	.....	1	....	....	....	.....
36–40	....	....	....	....	.....	....	....	....	....	.....	....	....	....	....	.....
41–45	....	....	....	....	.....	....	....	....	....	.....	....	....	....	....	.....
46–50	....	....	....	....	.....	....	....	....	3	.....	....	....	....	3	.....
Over 50	....	....	....	....	.....	....	....	....	1	.....	....	....	....	1	.....

VALLEY AND LEVEL-UPLAND FARMS.

None	....	9	6	6	8	1	12	12	6	22	1	21	18	12	30
1–5	1	2	3	2	1	1	1	11	1	4	2	3	14	3	5
6–10	3	1	3	3	3	3	5	5	4	6	6	6	8	7	9
11–15	2	....	....	1	.....	11	5	4	5	3	13	5	4	6	3
16–20	4	....	....	....	.....	6	4	2	3	1	10	4	2	3	1
21–25	2	....	....	....	.....	2	5	1	3	.....	4	5	1	3	.....
26–30	....	....	....	....	.....	3	2	1	7	.....	3	2	1	7	.....
31–25	....	....	....	....	.....	3	....	....	2	.....	3	....	....	2	.....
36–40	....	....	....	....	.....	2	1	....	1	.....	2	1	....	1	.....
41–45	....	....	....	....	.....	....	....	....	1	.....	....	....	....	1	.....
46–50	....	....	....	....	.....	2	1	....	1	.....	2	1	....	1	.....
Over 50	....	....	....	....	.....	2	....	....	2	.....	2	....	....	2	.....

Oats, kafir, millet, and sorghum crops are utilized as auxiliary sources of feed, and the feed requirements of the farms determine the acreage devoted to these crops. These crops were grown more frequently on the hilly farms.

CORN.

Corn is relied upon as the main feed crop of the region, and on practically every farm as many acres of it are put in as possible. A rotation system has been definitely adopted on farms in many sections. In other sections the system has not been so definitely worked out, and on some of the most fertile bottom farms corn is planted year after year. The thin soils of this region will not stand continuous corn cropping, and the general practice is to plant corn one or two years, followed in the fall by wheat or in the spring by oats. With the winter cereal, grass and clover are seeded, and during the following years hay is cut as long as the stand remains good. After haying, the sod may be devoted to pasture for a few years.

The two most important problems with which these farmers are faced in crop production are frequency of droughts, to which this country is subjected, and the low productivity of the soils.

The Missouri State Board of Agriculture has for a number of years published estimated yields of crops by counties, and to show how seriously the corn crop is affected by droughts in this region the following table is presented, giving such yields for the county of Texas, together with the precipitation for July and August recorded at Houston, Texas County.

TABLE VIII.—*Yield of corn and rainfall.*

Year.	Total yield of corn in Texas County.	Combined July and August rainfall at Houston.	Year.	Total yield of corn in Texas County.	Combined July and August rainfall at Houston.
	Bushels.	*Inches.*		*Bushels.*	*Inches.*
1907	830,963	3.72	1913	671,749	4.68
1908	964,100	6.13	1914	313,140	7.03
1909	1,027,120	9.02	1915	680,600	11.10
1910	1,551,056	10.51	1916	843,291	3.54
1911	1,087,860	11.49	1917	1,019,568	6.62
1912	1,085,133	10.86			

The frequency of rainfall throughout the growing season is a very important factor. To illustrate, the July-August total precipitation was almost identical in 1917 and 1914, but in 1914 6.07 inches of rain fell in August, while in May, June, and July, respectively, but 0.24, 0.85, and 0.96 inches of rain fell. In 1917 the May, June, July, and August precipitation in inches was 2.25, 3.18, 3.35, and 3.27, respectively. In 1914 the corn crop was 313,140 bushels and in 1917 1,019,568 bushels.

Many factors besides rainfall can have a very great influence upon crop yields. The above table, however, does show in a general way how very seriously the corn crop has been affected by droughts in this county; and farmers, not only in this county but in every county

visited, appreciate the effect of this factor upon their returns over a period of years.

For greater assurance of returns the farmer is interested in a system of farming which will economically maintain humus in the soil, and thus add to its water-holding and drought-resisting capacity.

The sale of corn is relied upon to some extent for income, but more generally corn is raised to meet the live-stock needs. As shown in Table IV, the yield of corn throughout this region is low. Many farmers, however, are increasing their yields by feeding most of their crops to live stock, thereby returning a good supply of manure to the soil each year.

SILAGE.

Five of the operators with upland farms and ten of the operators with bottom and valley farms had silos. The use of silage has long proved to be profitable under certain conditions and is being increasingly practiced by farmers in this region. Some farmers harvest the corn and put up the stalks for silage. The use of saccharine sorghums for silage has been tried in only an experimental way by a few of the farmers, but with favorable results. Sorghum makes satisfactory silage, and in view of its excellent drought-resisting qualities it should have an important place among the farm crops of this region. In certain sections of the South it is used for this purpose almost to the exclusion of corn, and uniformly good results are obtained. Pastures suffer along with other crops during the periods of drought, and many farmers in this area, particularly those extensively engaged in dairying, realize more and more the importance of providing silage for the winter feeding period, and to supplement the pastures during the periods of drought.

WHEAT.

The greater part of the crop receipts was from the sale of wheat. The soils throughout this area can not stand continuous grain farming. Wheat and other grains should remain, as they are now, subsidiary crops on the general live-stock farm. Winterkilling does not occur to any great extent. During the year of the survey, however, 45 acres of wheat, or 7 per cent of the acreage planted, was so killed on the farms from which records were obtained.

RYE AND BARLEY.

Rye and barley are relatively unimportant crops in this region, though on the thinner soils in the "uplands" rye would perhaps bring as good returns as wheat. Rye was grown more often than barley.

TIMOTHY AND CLOVER.

Timothy and clover are the main hay crops at present, and both do well in good seasons. The humus content of the soil is very low on some farms, and where such is the case it is difficult to get a good growth of clover. However, clover does well where the soils are kept in good condition by a proper system of crop rotation and pasturing. For greater assurance of a crop of hay most farmers make it a practice to plant both timothy and clover in seeding meadows.

ALFALFA, SOY BEANS, AND COWPEAS.

A very limited area was planted to alfalfa, soy beans, and cowpeas. A few operators were found raising a few acres of alfalfa with moderate success on the better grades of soil. If the known precautions against acidity are taken and the soil inoculated, the area can be profitably increased. In establishing alfalfa liberal application of stable manure has been found necessary on most of the farms. Soy beans were also grown by a few of the farmers from whom records were obtained, usually a limited area in corn for silage, and in two or three instances as a separate hay crop. The acreage of this crop could well be increased, both for the purposes just mentioned and also as a grazing crop for hogs. Cowpeas do well, and make an excellent hay. They could be sown to advantage with the sorghum and millet hay, and the quality of the hay would be greatly improved without materially decreasing the tonnage. Certainly, more leguminous crops should be raised, both because of their soil-building powers and also to afford additional feed for stock. The price of concentrates, cotton-seed meal, bran, linseed meal, etc., is extremely high, and many of the operators have abandoned feeding them. Unless satisfactory substitutes are used, this can not be done without suffering a loss both in milk production and in growth of stock, and also a loss of returns from the other feeds fed. With an abundant supply of leguminous hays, clover, alfalfa, soy bean, or cowpea, a satisfactory balanced ration can be provided by feeding them in conjunction with sorghum or corn silage, or other hays with some corn.

KAFIR, MILLET, AND SORGHUM FOR HAY.

Most of the farms studied had an acreage of sorghum, kafir corn, or millet, as an auxiliary hay crop, because the droughts at times almost entirely ruin the meadow hay crop. In view of the drought-resisting qualities of the sorghums, they undoubtedly will receive much consideration in the future cropping systems of this area. Sudan grass is also worthy of consideration in the arrangement of profitable cropping systems in this area. Where such a practice has been adopted the farmers have available for other purposes a

part of the acreage otherwise devoted to hay. Such areas can be diverted into pasture, which allows a broader and more adequate basis for soil improvement, or they can be used as an aid in growing additional feed or cash crops.

OTHER CROPS.

Field beans, potatoes, and sorghum for sirup represent a minor source of income on many farms. A small area of field beans contributes substantially to the income of some farms. Some operators, however, have been unable to find a satisfactory sale for their crop. The marketing facilities of this region are very limited, and it would be unwise to include a large acreage of a new crop, such as field beans, without first having secured an outlet. Sorghum sirup and potatoes, when sold, represent usually the excess over the amount raised for home consumption, and are sold on the local markets. The principal miscellaneous crops sold are cotton and sweet potatoes raised in the southern part of the area. One operator who raised broom corn sold $390 worth of brooms. Small sales of berries, cherries, garden produce, etc., are also among the miscellaneous sales. The small operator is very much "up against it" for a cash crop in this region. Evidence of this is seen in the amount of receipts from the sales of ties, and receipts for work done off the farm. The entire region is too far north for the profitable production of cotton. However, with intelligent cooperation and the solution of the marketing problem involved, an increased amount of one or more of these minor crops (sirup, field beans, potatoes, and berries) could be sold from many of the smaller farms.

FRUIT.

Apples.—The apple enterprise seems to be very much neglected and on the decline on these farms. A total of 168 acres of apples was found on the farms studied, but this does not include many small areas reported for home use only. The trees in most instances were not cultivated, pruned, or sprayed. Many of the areas in orchards were used for pasture or hay and the trees were dying out. The returns from many of these orchards are of minor importance. The neglect in caring for them was due to the difficulty experienced in marketing previous crops. Only one farmer was found who sprayed and otherwise systematically cared for his orchard, and he, last year, from two acres of trees, sold over $400 worth of apples. They were all sold, however, on a local market, and he was furnishing about all it could handle. (See fig. 10.) There is no doubt, also, that many orchards in this region have been set on soils which are not suited to this purpose, particularly such as are underlain at a slight depth with a hardpan or solid rock.

FIG. 10.—The apple orchard shown in the upper picture received regular cultivation and spraying, and contributed substantially to the farm income of the operator. The peach orchard shown in the lower picture is quite typical of the orchards in the region. Winter-killing and late frosts seem almost to preclude profitable peach production.

Peaches.—Large areas of this region were set to peaches a few years ago. The crop was found to be very unreliable because of the late spring frosts and freezes, and winter freezing and lack of proper care have killed out many of the orchards.

Small fruit.—The production of strawberries and other small fruits which farmers reported very profitable in certain areas in the western part of the State, when undertaken on a small scale, can be commercially profitable only when undertaken in a community where there are sufficient growers to be able to club together and ship in carload quantities or where there is a local demand for the crop.

LIVE-STOCK MANAGEMENT.

The principal factors operating to make live-stock production the main industry in the region are: (1) Transportation facilities are such that, generally speaking, they preclude the marketing of products which are bulky or perishable; (2) the soils of the region are predominantly thin and, owing to the rock content, difficult to cultivate, and quickly deteriorate under continuous grain farming; (3) there is a large amount of wild land which, without cost to the operators, furnishes a varying amount of pasture to live stock of all classes; (4) the lands are adapted to the growing of grasses, and very good improved pastures can be made out of land which is apparently valueless for other purposes; and, (5) a system of farming with live-stock production as its base, if properly carried out, enables the operators to maintain and improve the quality of the cultivated land and furnishes a product which is easily marketed.

All ordinary classes of live stock do well in the region, and at present all are being produced. The raising of cattle is the oldest and most extensively developed branch of the industry. However, a large number of hogs, horses and mules, sheep and goats, and chickens, are raised in the territory. The desirability of not restricting the source of income to one enterprise on the farm has already been pointed out, and examples of individual farms present the favorable results obtained by combining a number of live-stock enterprises. Some of the farms received revenue from all classes of live stock mentioned, and the majority had three or more live-stock enterprises.

As to the combination of live-stock enterprises that will be most profitable on any given farm, local conditions must determine, and to a certain degree the inclination of the operator himself. The scheme of farming, however, should be such as to produce on the farm all feed needed by the live stock maintained and raised, and the farmer should strive constantly to improve the grade of the live stock kept. The higher the grade of live stock raised, the greater will be the returns from the feed consumed, under economic management.

Profits which may be expected from the various classes of live stock vary from year to year, as prices and local conditions vary. In 1917 operators who were successful in raising hogs almost uniformly showed a satisfactory farm income. There was a ready demand at high prices for all hogs offered for sale, an unusually heavy acorn and mast crop was produced in the woods, the feed cost was low for the majority of the hogs raised, and there was no general epidemic of hog cholera in the region. On the other hand, those operators who raised colts found little demand for them, and sales were made with difficulty and at a low price. The margin of farm profit contributed from year to year by the various enterprises varies according to conditions governing production and marketing. An analysis of the receipts shows that cattle and hogs were the live stock which contributed the largest return on these farms.

FIG. 11.—Type of dairy herds kept for production of cream.

The profitable production of cattle in this region depends upon grazing to furnish the bulk of feed required during the summer, with sufficient grain and hay raised on the farm to maintain them during the winter. The bulk of the cattle sales are in the late summer directly off the pastures, though an occasional farmer produces sufficient corn for feeding out a bunch of cattle during the winter. Cream is also being sold from this country in increasing volume. (See fig. 11.)

CREAM PRODUCTION.

This territory is well provided with a market for cream, creameries being located at a number of the more important railway stations, and a few operating at interior points. Practically every little village has one or more cream-receiving stations. It is difficult to overstate the help this has been to many farmers, particularly to those operators of only moderate-sized farms to whom the steady

cash receipts from the sale of cream, though small, was the one factor which enabled them to go ahead with their work of improving and enlarging their farms and building up their herds of live stock, even in some cases preventing actual farm disaster. The sale of dairy products represented a source of cash income for 43 out of the 79 farms for which records were taken. The average amount of sales for farms selling dairy products was $215. On some farms the sales amounted only to an occasional few pounds of butter or cream and on a few farms it constituted the chief source. On many farms the sale of cream was one of the major sources of income.

A few of the farmers had kept records of the amount of their sales of butter fat through the year, and one of the local creameries kindly gave information as to production of a few additional farmers with whom the sale of butter fat was a major source of income. In this way the accurate butter-fat production for seven of the better herds of dairy cows in the region was obtained for the year 1917, as is shown in the following table:

TABLE IX.—*Butter-fat production of seven dairy herds.*

Farm.	Butter fat sold.	Average price per pound.	Value of sales.	Average number of cows.	Average production of butter fat per cow.	
					Quantity.	Value.
	Pounds.				*Pounds.*	
1	980	$0.438	$429	9	109	$48
2	1,563	.421	658	10	156	66
3	2,812	.409	1,152	18	156	64
4	2,525	.424	1,076	18½	136	58
5	996	.391	390	6½	153	60
6	1,563	.421	658	12	130	55
7	640	.40	256	4	160	64
Total	11,079	.417	4,619	78	142	59

Included in the above dairy herds are two herds of Jersey and Guernsey grades, one of grade Holsteins and Jerseys, two of grade Jerseys, one of grade Guernseys, and one containing some grades and also some purebred Jerseys.

The average price per pound received varies slightly, owing to the fact that creameries located at interior points had to pay extra transportation charges, and therefore could not pay quite the prices which prevailed at railroad points; and also to the fact that the quantity of cream sold by the different operators varied during the year, and hence the cream was sold at varying prices.

Since the dairy business is an enterprise comparatively new to this area, the average butter-fat production per cow naturally was very much lower than it should be for the most satisfactory returns. The farmers are becoming much interested in the dairy business, however, and improvements are being made gradually. One operator

sold out his old herd and bought a new one during the year. Another reason for the low average production of many herds was that they are being increased from year to year by the addition of a few young cows. With an average annual butter fat production of only 142 pounds per cow, many farmers have very little chance of making money from the sale of dairy products.

The importance of high production per cow can not be too greatly emphasized. At present a small number of grade and pure bred dairy calves and heifers are being imported into this region at various places. The importation of a few high class pure bred dairy bulls, of proved ability to get high-producing daughters, and the breeding of these bulls to the native cows, is believed to be an economical and logical method of quickly improving the quality of dairy cattle in the region. Mature dairy bulls of proved high class are rather expensive, but they can be bought cooperatively with great advantage to the individual operators cooperating, and at a greatly lessened individual cost. In the selection of a bull the best dairy specialist available should be consulted, and this is especially essential when it is deemed advisable to purchase a bull calf.

The feeding of a ration which supplies the necessary nutritive elements in the proper proportions is essential in all branches of the live-stock business, but especially in dairying. If this is not done the maximum milk production is not obtained, and there is a literal waste of feed because much of the nutritive value of the feeds in a poorly balanced ration is not utilized when eaten. The production of more leguminous hay crops on the farm, as suggested in other parts of this report, with corn or corn and sorghum silage, will furnish the most satisfactory and economical basis for balanced rations in this territory. It is essential that in solving this problem of balanced rations the best available dairy specialist be consulted.

A careful study of the individual cows in the herd should be made, to ascertain the cows which are really profitable and those which are not. This is done by keeping a record of the amount of milk produced by each cow, and periodically testing the butter-fat content of such milk. Cow-testing associations formed under the direction of a competent dairy specialist afford the average dairyman and farmer the most practical method for doing this work.

Many factors affect the desirability of producing and selling dairy products on a given farm. Among these are availability of labor for milking and preparing the product, need of an additional source of cash income, number and character of cows kept, and relative profitableness of other employment for labor. A large proportion of the farms studied had found it advantageous in their organization to sell some dairy products.

Forty per cent of the farms reported cattle losses. There was no epidemic of a contagious disease, and the losses that occurred were probably such as may normally be expected. These losses represented 3.6 per cent of the cattle kept.

HOGS.

Hogs, when raised on the acorns and mast in the woods, furnish perhaps the cheapest meat produced in the Ozarks. This, however, is quite a precarious business, owing to the losses due to predatory animals, stealing, accident, and the uncontrolled epidemics of hog cholera to which hogs on the range are subjected. The acorn and mast crop is also quite variable. In some years there is no crop at all, while during others there is an abundant crop. If there is an acorn crop and the hogs are turned on the range, the additional feeding of some corn is usually found profitable. The corn will induce better gains. The feeding of skim milk, when cream is sold off the farm, affords a profitable opportunity for hog production. Soy beans, and cowpeas planted separately or in corn, and used as grazing crops, also provide good feed for the hogs. Because of the serious losses sustained on the range, many farmers are inclosing woods land, and not allowing the hogs to rove beyond the confines of the farm.

Hogs were kept on 74 of the 79 farms. Thirty-three farms reported losses of hogs, leaving 55.4 per cent of the farms which suffered no such loss. One hundred and sixteen hogs were reported as having died during the year, and 54 small pigs. (These figures do not include losses of pigs at farrowing or of very young pigs lost in the woods.) The year was favorable to hog production, there being no epidemic of cholera or other infectious disease. The percentage of hogs lost to the total number of hogs handled on all the farms was 10.75. The percentage of loss on the farms which suffered losses was much higher. In view of the fact that 41 farms sustained no losses whatever and that many of the farms that conducted an extensive hog business suffered only slight losses, it is evident that by better care this loss could be materially reduced.

HORSES AND MULES.

On some of the farms the raising of colts contributed substantially to the farm income. On other farms, not enough colts were raised to replace losses of work stock. Eleven farms reported losses of horses, 86 per cent of the farms suffering no losses at all. The total number of mature animals that died was 10, and of colts 4. The proportion of horses and mules lost to the number on hand during the year was 3.43 per cent. This, as in the case of cattle, represents a normal and unavoidable loss.

SHEEP.

Sheep are usually raised on farms so situated that they are not subject to destruction by predatory animals. Because of the increased prices, sheep production was a profitable and satisfactory enterprise for the year under study.

Seventeen of the 79 farms studied reported sheep. On 13 of these farms losses were sustained; 19 mature sheep and 17 lambs were reported as having died, representing a loss of 8.9 per cent. (This does not include lambs lost at lambing or while only a few days old.) In the majority of cases the sheep were kept in enclosed pastures, and the farms keeping sheep were, as a rule, in communities where the keeping of sheep has been practiced for some time. Only one sheep was reported specifically as having been killed by dogs, though in the case of a few operators who allowed their sheep to range the woods losses were probably caused by dogs or wolves.

GOATS.

Within recent years the goat has come into a regularly established place on the market, and this fact, together with the great value of the goat in cleaning up land, makes its production especially desirable in the Ozarks. Goats and cattle will pasture the same land to advantage. Only nine farms reported having goats. Eleven and three-tenths per cent of the number maintained on the farm through the year were lost. Of the 12 mature goats and 10 kids which died during the year, dogs killed 6 of the goats and some of the kids. Contrary to a widely held opinion, the goat can not successfully defend itself against vicious dogs, and unless necessary precautionary measures are taken serious losses may be caused by dogs both to mature animals and to unborn and young kids. The goat is an extremely hardy animal, and very valuable, especially in this section, for clearing out underbrush. With proper attention the percentage of loss which occurred in the year considered could be materially reduced and as the goat now has a ready market value besides its great value to this section for keeping the underbrush and sprouts eaten off, such attention would be profitable.

POULTRY.

The sale of poultry and eggs returns a substantial portion of the total cash receipts of many farms. (See fig. 12.) The section is not one of intensive poultry culture. However, the great majority of the farmers keep chickens, which are supported largely by grain and food which otherwise would be wasted. A certain amount of grain is fed directly to the chickens, mainly corn and kafir corn raised for the purpose. A record was obtained from one farm on which the sale

of capons and broilers and eggs brought the major portion of the farm income. The average farmer, however, unless adept at the art of raising chickens, may find it more profitable to subordinate the poultry enterprise. The aggregate amount of chickens and eggs produced in the Ozarks is large, and Springfield, Mo., is recognized as one of the leading poultry markets of the country.

PASTURE.

The rough topography of a large portion of this region makes the grasses of prime importance. The increase in the live-stock industry in the last few years has intensified the need of pastures. In the early years the open range furnished an abundance of grass until late

FIG. 12.—This woman raised and sold 100 capons, 1,000 broilers, and a large number of hens during the year of the survey. In addition, she helped in the milking of 10 cows.

fall. No feed was given during the grazing season, and in the late summer or fall the marketable cattle were sold. The woodlands were burned over each winter to restrain the growth of underbrush and small trees.

As the country became more populous, however, farms became more numerous through the range territory, and the number of cattle and other live stock on the range increased, bringing heavier demands on the pasture. After the erection of more fences and buildings throughout the region the practice of burning over large areas was gradually restricted. Burning the woods was detrimental to the mast and acorn crop, and was gradually discontinued as hog production became an important enterprise.

Farmers in this area are vitally interested in the economic problem of pasture production. Since the introduction of dairying as an important enterprise it has become necessary to keep the cows closer at hand than was possible when they were turned free on the unrestricted range. The net result of this situation is that those farmers who formerly depended upon the range to support the live-stock business now find it necessary to provide supplementary pasture on their own land, and such reorganization had been effected on a number of farms at the time this study was made.

The farms have two sources of possible pasture—one, that part of the tillable area of the farm devoted to pasture in the regular farm rotation; the other, adjoining woodland, properly fenced, on which the growth of grasses is encouraged. On the average farm in this territory feed can be grown to support during the winter more cattle than the tillable area in pasture will support during the summer, and the making of improved pastures out of adjoining woods has become an important undertaking. Undoubtedly the greatest possibilities for expansion of pasture lie within those areas which, because of topographical features and rock obstructions, are suitable for pasture but not suitable for cultivation of crops.

The keeping down of underbrush is the greatest problem involved in this conversion of rough land into improved pastures. It is very difficult for one who has not been in this territory to realize how rapidly and densely underbrush grows with the slightest opportunity, and this growth when not controlled shades the ground so completely that grasses are crowded out. If this growth is kept back, the native grass comes voluntarily and furnishes a fairly good grade of pasture. (See fig. 13.)

Lespedeza (Japan clover), having become naturalized, grows freely, and while it makes a rather late start in the spring, contributes materially during the season to the grazing. White clover grows freely everywhere. These crops in good seasons on fair soil can be made to furnish excellent grazing. Bluegrass and orchard grass thrive, and when planted make a pasture which comes in earlier in the spring, lasts longer in the fall, and has a greater carrying capacity throughout the season than any other.

Much attention has been given the fencing of pasture land in this area during the last few years. From the data submitted by the farmers interviewed, putting up 1 mile of woven-wire fence requires approximately 33 to 38 days of man labor, and 3 to 4 days of horse labor. In addition to this the horses may be used in conveying the men to and from the place of work. The post material ordinarily in use will last about 10 years, if properly seasoned before using. Some farmers clear their fence rows each winter, either by dragging or otherwise, for protection against forest fires. Much land is now

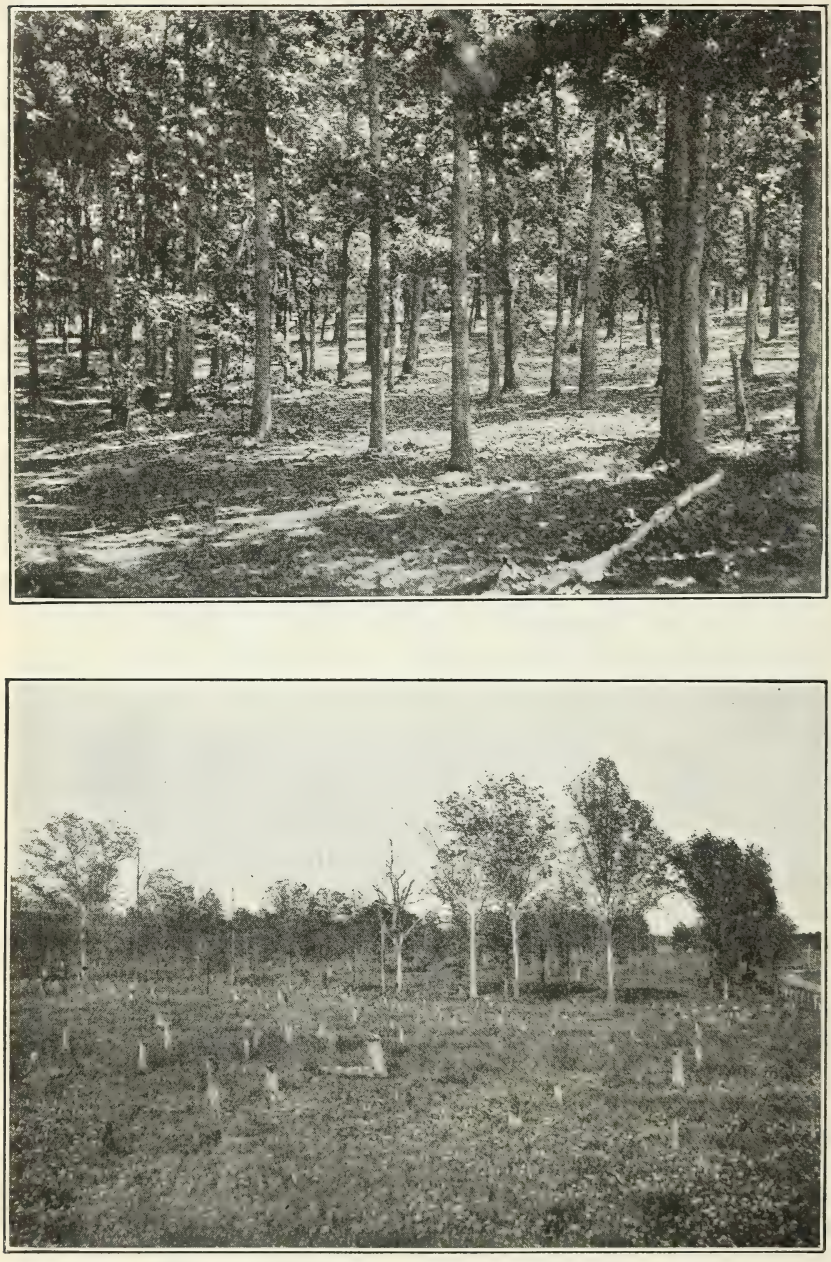

FIG. 13.—Pasturage in the Ozarks. Land such as that illustrated by the upper picture furnishes practically no pasturage. The lower picture shows a good pasture made from land of the same character.

more intensively used for pasture than formerly, through fencing and deadening the growth on woodland areas.

In converting the woodland areas into pasture the first step is killing, or, as it is commonly expressed, "deadening," the large trees and cutting out the underbrush. Where the salable timber has not all been removed, enough tie timber may be utilized to offset a part or all of the cost. The usual method of deadening the trees is to girdle them. Trees of less than 3 inches in diameter are cut down. After deadening the standing timber and cutting off the smaller trees the problem is largely one of controlling the growth of underbrush. This situation is expressed by the local phrase, "There are more trees under the ground than above it." The farmers have found it desirable to deaden the trees during the spring or early summer, as the trees die sooner and more surely, and as girdling 2 to 4 feet above the ground and chopping off the smaller trees at this height reduces the sprouting from the roots. For best results the sprouts should be cut two or three times yearly, depending upon the density of the growth, sometimes for four or five years in succession, though the amount of work involved decreases each year.

Another practice useful in ridding this land of sprouts, and one which eliminates the greater part of the labor, is to pasture goats on it. Since their natural food is leaves and tender sprouts, goats find sufficient forage on the "deadened off" area to thrive and at the same time keep these sprouts from making growth. However, experience has shown that for best results in reducing sprouts the goats should not have access to a great amount of grass. If grass is obtainable goats will not eat the sprouts off thoroughly. Some farmers separate the brush areas from the pastures, and alternate the goats from one to the other during the growing season. In this way the goats are kept in better condition, while aiding materially in brush control. (See fig. 14.) This method is desirable because the goats can be used as a source of profit. There are relatively few goats in the territory, and as their value is now clearly realized they can be bought only with difficulty. The general opinion in the region was that if goats pasture such land for two seasons, the sprouts would be very effectively killed, and very little subsequent work required to keep the growth down entirely. Goats require rather substantial fencing for the most satisfactory results.

Considerable variation exists in the method used in getting a good stand of grass on these lands. Some areas afford sufficient native grass pasture to be of value without the addition of tame grass. However, the sowing of tame grasses has been found desirable. Good pastures have been established both with and without cultivation before seeding.

In seeding land to grass without cultivation or harrowing, the best results have been obtained by first burning the area thoroughly, so that the ground is free from leaves and brush. The seed is sown

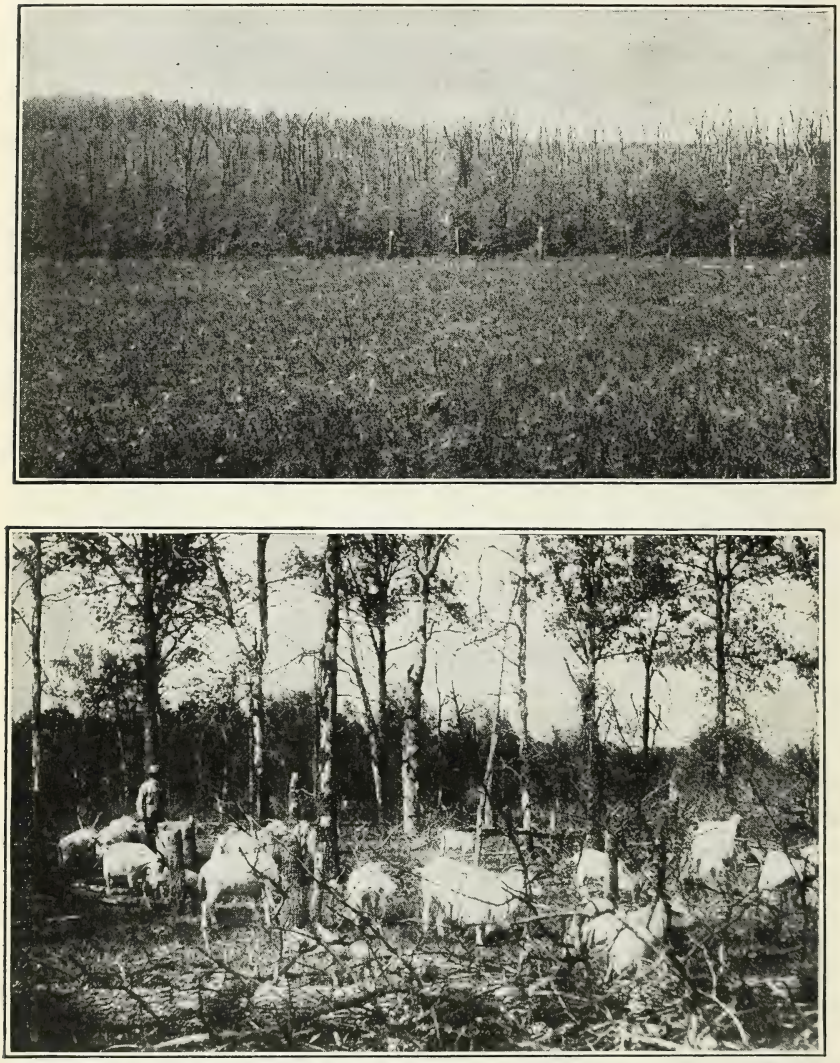

FIG. 14.—Above, woods which were deadened a few years ago. Measures were not taken to prevent the growth of sprouts and underbrush, and as a consequence this land has no pasture value to-day. Lower, similar land, on which, after deadening, goats kept the sprouts killed back. This land in a short time will be an excellent pasture.

broadcast, usually during the spring months. Eight to 12 pounds of mixed seeds, consisting of 1 bushel of bluegrass, 1 bushel of timothy, and 3 pounds of white clover seed, are sown to the acre. The first year the grass should not be closely pastured. Some operators allow

cattle to have access to the new pasture, and at the same time to an old, well established pasture sufficient to maintain them. There is then no danger of the cattle cropping the new pasture too closely, but they assist in keeping the young sprouts down. By the third year the newly seeded areas are usually established and capable of furnishing grazing. (See fig. 15.)

The clearing of this land for cultivation before seeding to grass under the ordinary practice usually requires several years. The first year after clearing land the pasture is not materially improved. The second year the native grasses, together with crab grass, beggar lice, lespedeza, and young sprouts, furnish considerable pasture. The

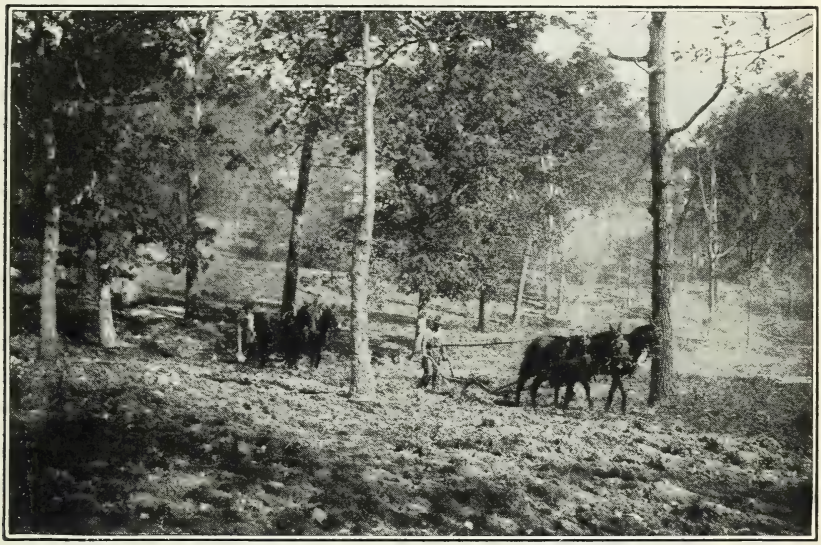

FIG. 15.—Burning off and breaking, a step in the process of clearing land for cultivation or for making an improved pasture. The owner of this land intends to make an improved pasture of it, hence, when the woods were deadened a few years ago some trees were left for shade. He will raise a cultivated crop on it for one year, and in this way finish killing the sprouts and underbrush, after which a mixture of tame grasses and clover will be sown.

second winter the dead and fallen timber is again burned off, and improved conditions provided for the third grazing season. After the third season the native pasture ordinarily will not improve materially; practically all of the dead trees have fallen, and the land can be placed in fair shape for breaking. About the fourth season the land is broken, and a cultivated crop, corn usually, is planted. Following this crop a mixture of grass seed is sown broadcast, and harrowed in. Good results have followed from sowing 10 to 15 pounds per acre of a mixture—white clover 1 pound, red clover 2 pounds, orchard grass 5 pounds, and bluegrass 5 pounds. Under favorable conditions, by the middle of the following summer these seedings should furnish some pasture.

One great advantage of pasture made from the tame grasses is that they furnish grazing earlier in the spring, and for about four to six weeks longer in the fall than native grass pastures.

THE ORGANIZATION AND PROFITS OF INDIVIDUAL FARMS.

To be profitable a farm should follow the type of farming best adapted to its conditions, should be efficient in the use of both man and horse labor, adequately yet economically equipped and as good as or better than the average farm of its type in size of business, yield of crops, and returns from live stock. The land must be capable of growing crops for sale or crops to be utilized in producing something which can be sold. Crops which are not in either of these classes will not profit the producer, even though the land is suited to their production, nor will their production be profitable unless they are utilized when produced. Thus, though a farmer has land suitable to the production of a perishable crop requiring a highly organized marketing system of distribution, if he is located in a section where such an organization is not available and has not the ability or the means to provide it, it would not pay him to produce such a crop. The land operated may also be too high in price to produce profitable returns on the investment under the type of farming to which it is best adapted.

Many factors cause a variation in the profit from various farm products from year to year. One year a product may be produced at a profit, the next at a loss, or the attempt to produce it may result in a failure. The farming business, however, has to go on each year, and in regions where wide variations both in yields and in prices exist the farmer may have a greater assurance of an income each year by having a combination of revenue-producing enterprises. Should one or two fail, the income from the others will compensate the loss. These enterprises should be so organized that labor may be utilized as effectively as possible throughout the year.

The statement and analysis of combined farms afforded the opportunity of observing what enterprises, considering the region as a whole, were being exploited and to what extent they were productive of revenue.

In figure 16 is shown the labor income (each bar represents the labor income of a farm) of each of the valley and level-upland farms and each of the hilly farms. The farms are arranged according to the acreage devoted to crops, beginning with the farm having the smallest acreage of crops. From this chart it will be seen that of the valley and level upland group only one farmer earned over $2,000 labor income, and he had next to the largest acreage in crops. Fifteen had over $1,000, and eight earned no cash wage for their year's labor and less than 5 per cent on the capital invested. Of the hilly farms,

only two made $1,000 or over, and six earned no cash labor income and less than 5 per cent on the capital invested. As previously pointed out, each farmer had, in addition to his labor income and interest on investment, house rent, home-grown food products, and fuel furnished by the farm, factors that contribute considerably to the family living.

The labor income data shown in this figure and in the following data for 10 individual farms serve to emphasize the variation in

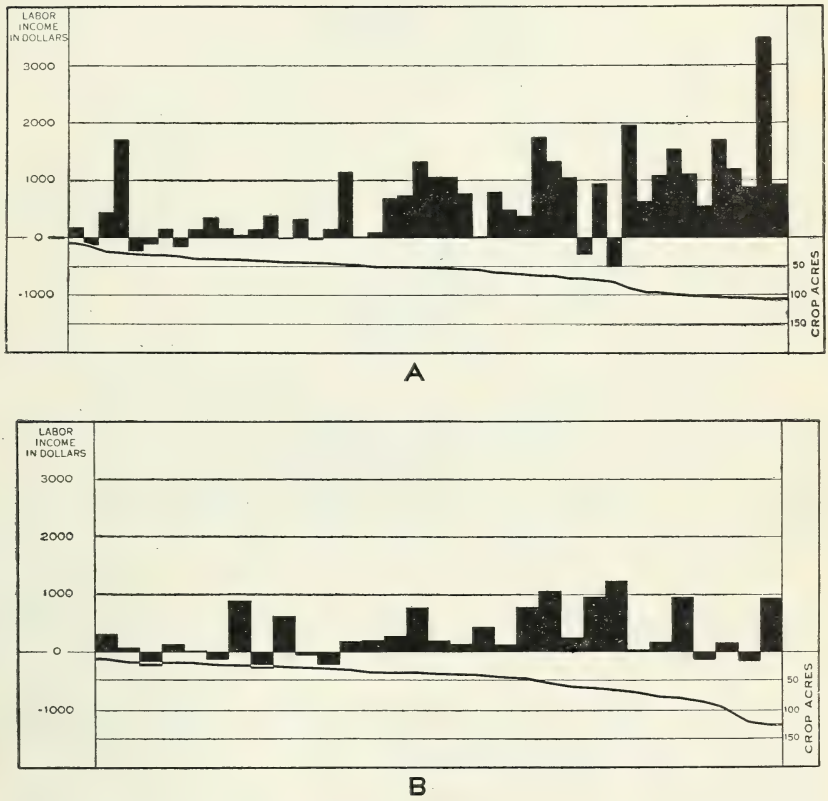

FIG. 16.—Relation of size of farm to labor income. (A, 48 valley and level-upland farms; B, 31 rolling and hilly upland farms.) Each bar represents the labor income of one farm, beginning at the left with the smallest farm.

returns within a year. Some farmers are making good labor incomes, while others fail to receive anything for their year's wages above the supplies furnished the family by the farm. In farming, as in any other occupation, the more satisfactory returns are for those who practice the best methods. The wide range in labor income as shown by a study of each farm gives evidence that the man of skill, industry, and good judgment is the one who receives the highest rewards in operating a farm.

In the following analysis of the business of 10 individual farms, opportunity is afforded for a study of the factors which determined their success or failure for the year. Along with the analysis of each farm business is a brief discussion of the farm considered. Each farm here analyzed is deserving of careful study.[1]

FARM NO. 1.

DISTRIBUTION OF FARM AREA.

Crop area	acres	23
Woods and waste	do	10
Pasture	do	7
Total farm area	do	40

DISTRIBUTION OF CAPITAL.

Land and buildings	$500
Live stock	165
Machinery	57
Feed and cash	250
Total capital	972

ACREAGE AND YIELD OF CROP.

Crop.	Total yield.	Acres.
Corn, bushels	110	12
Rye, do	35	6
Oats and millet hay, tons	3	3.75
Potatoes, bushels	40	.50
Fruit		.75

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	1	2	1
Calves		2	1
Horses	2		
Brood sows		1	
Hogs		1	6

DISTRIBUTION OF RECEIPTS.

Source.	Amount sold.	Value.
Corn, bushels	15	$22
Cattle		35
Hogs		37
Total receipts		94

DISTRIBUTION OF EXPENSES.

Family labor	$100
Repairs to machinery	13
Seed	28
Other expenses	14
Depreciation, machinery and buildings	18
Total expenses	173

Farm income (difference between receipts and expenses)	−$79
5 per cent interest on capital	49
Labor income (loss)	−128

Farm No. 1 is a small farm in a rough and rocky section. This farm gives an illustration of the hardships and difficulties which confront an inexperienced operator with limited means attempting to establish a small farm on the poorer upland soils of this region.

This operator bought his farm in 1908, using practically all of his money in the purchase of the 40 acres. In the 10 years following he suffered disaster a number of times, from crop failure due to drought and from loss of live stock. Being a mechanic, he returned to St. Louis after each disaster and worked until he had accumulated enough money to purchase more work horses and supplies. In this way, he has spent 4 of the 10 years preceding 1918 in St. Louis, his wife and two small children living on the farm in his absence, but unable to do much farming. He had worked the greater part of 1916 in St. Louis, and, as he said, returned for the fifth start. At the beginning of the farm year covered by this study he had live stock consisting of 1 cow and 2 horses. He spent four months out of the year in St. Louis and with his savings purchased for $215, 2 cows, 2 calves, and 2 hogs.

[1] The first five of these farms are rolling and hilly farms, and the next five are valley and level-upland farms.

The total year's income on this farm was only $94, while the expenses were $173. Not having raised any crops for sale, and having practically no live stock, he has no chance of making a farm income after paying the year's expenses and allowing the value of labor performed by his family.

FARM NO. 2.

DISTRIBUTION OF THE FARM AREA.

Crop area	acres	24
Woods and waste	do	19
Pasture	do	15
Total farm area	do	58

DISTRIBUTION OF CAPITAL.

Land and buildings	$1,800
Live stock	392
Machinery	162
Feed and cash	80
Total capital	2,434

ACREAGE AND YIELD OF CROPS.

Crop.		Total yield.	Acres.
Corn	bushels	500	20
Cane	gallons	225	4

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	1		
Calves			1
Horses	1		
Mules	2		1
Sheep		6	
Brood sows	1	2	
Hogs	12	9	22
Poultry	20		49

DISTRIBUTION OF RECEIPTS.

Source.		Amount sold.	Value.
Corn	bushels	267	$336
Sorghum sirup	gallons	175	105
Sorghum seed			70
Cattle			29
Colts			90
Sheep and wool			3
Hogs			443
Poultry and eggs			47
Labor off farm			20
Total receipts			1,143

DISTRIBUTION OF EXPENSES.

Repairs to machinery	$10
Repairs to building and fences	25
Feed	50
Other expenses	28
Depreciation, machinery and buildings	37
Total expenses	150

Farm income (difference between receipts and expenses)	$993
5 per cent interest on capital	122
Labor income	871

This is a small farm situated on good upland soil. It is located in a section where an abundance of free range is available. Corn and sorghum were the only crops planted. The 4 acres of sorghum was used partly for sirup, and the rest for hay after thrashing the seed. The live stock consisted of 1 cow, 1 old mare, 2 mules, 1 sow, and 12 shotes, and a small flock of chickens. A calf was raised and sold, also a valuable mule colt.

This farmer found the hog business quite profitable and increased his enterprise on his farm by the purchase of 2 sows and 9 shotes. The year's revenue from hogs was $443. The abundant pasturage available enabled the farmer to produce hogs mainly on the mast on the range, and the work stock and cow required very little feed in addition to pasture, with the result that 267 bushels of the corn was sold, also $105 worth of sorghum sirup and $70 worth of sorghum seed. The expenses were not heavy. However, it should be noted that it was found necessary later to buy $50 worth of feed.

All the labor on this farm was performed by the operator himself, and for the year's labor the farmer had $871 after paying all expenses and allowing 5 per cent interest on the capital invested.

FARM NO. 3.

DISTRIBUTION OF FARM AREA.

Crop area	acres	95.5
Woods and waste	do	36.5
Pasture	do	51.0
Total	do	183.0

DISTRIBUTION OF CAPITAL.

Land and buildings	$5,000
Live stock	1,546
Machinery	443
Feed and cash	333
Total	7,322

ACREAGE AND YIELD OF CROPS.

Crop.	Total yield.	Acres.
Corn, bushels	555	22
Potatoes, do	85	1.5
Wheat, do	165	15
Rye, do	10	.75
Oats, do	102	5
Hay, tons	28	50
Apples (in pasture)		18
Garden		1.25

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	8		
Heifers	7		
Calves	5	2	11
Bulls	1		
Steers	7		
Horses	5		
Sheep	13	1	
Lambs	10		10
Brood sows	2		
Hogs			21

DISTRIBUTION OF RECEIPTS.

Source.	Amount sold.	Value.
Potatoes, bushels	6	$9
Wheat, do	66	136
Oats, do	48	41
Apples		20
Corn, bushels	75	105
Hay		23
Cattle		635
Dairy products		133
Colts		50
Sheep and wool		147
Swine		486
Total receipts		$1,785

DISTRIBUTION OF EXPENSES.

Hired labor	$67
Family labor	600
Repairs to machinery	33
Repairs to building and fences	32
Feed	270
Seed	46
Fertilizer	40
Other expenses	102
Depreciation, machinery and buildings	74
Total expenses	1,264

Farm income (difference between receipts and expenses)	$521
5 per cent interest on capital	366
Labor income	155

This is one of the larger upland farms with a rolling topography. It was poorly organized, as will be observed by a study of the acreage and production of crops, amount and returns from live stock, the size of the feed bill, and the amount of both man and horse labor used. Quite a large area was in meadow hay. Eighteen acres of apples had also been planted, but the trees were being allowed to die out, and the acreage last year was cut for meadow hay. Quite a large amount of live stock was kept. Cattle sales amounted to $635, and furnished the largest single source of income, with hogs, $486, the next largest. Revenue was also obtained from dairy products, colts raised, sheep, wool, crops and fruit.

If this farmer were to pay his family the value of their year's work at $600 and pay interest on his investment at 5 per cent he would have left for his own year's labor

only $155. Compare with No. 4 as to organization of crop land, amount of labor used, feed purchased, live-stock production, and amount of work stock kept, and it will be easy to detect why this farmer got only $155 as labor income for his year's labor while No. 4 got over $1,000 for his.

FARM NO. 4.

DISTRIBUTION OF FARM AREA.

Crop area	acres	55
Woods and waste	do	70
Pasture	do	35
Total farm area	do	160

DISTRIBUTION OF CAPITAL.

Land and buildings	$5,600
Live stock	1,454
Machinery	647
Feed and cash	117
Total capital	7,818

DISTRIBUTION OF CROP AREA.

Crop.	Total yield.	Acres.
Corn, bushels	500	17
Corn for silage, tons	60	8
Kafir corn, do	1.5	2
Wheat, bushels	115	9
Oats, do	117	3.5
Hay, tons	9	12
Apples		2
Garden		1.5

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	9		
Heifers	3	2	
Calves	8		13
Horses	3		
Oxen	1		
Colts	1		2
Sheep	6	1	
Lambs	8		8
Brood sows	1	1	
Hogs	3		10
Poultry	65		50

DISTRIBUTION OF RECEIPTS.

Source.	Amount sold.	Value.
Wheat, bushels	25	$50
Hay, ton	1	17
Corn, bushels	175	262
Oats, do	15	11
Dairy products		400
Cattle		615
Colts		85
Sheep and wool		230
Hogs		376
Poultry and eggs		177
Total receipts		2,223

DISTRIBUTION OF EXPENSES.

Family labor	$400
Repairs to machinery	15
Repairs to buildings and fences	35
Feed	23
Seed	27
Other expenses	73
Depreciation, machinery and buildings	100
Total expenses	673

Farm income (difference between receipts and expenses)	$1,550
5 per cent interest on capital	391
Labor income	1,159

This is a highland farm with rolling topography, which was operated quite successfully. Fifty-five acres of crops were raised, consisting of corn, wheat, oats, kafir corn, meadow hay, apples and garden crops. It was not necessary to purchase any feed in addition to that raised, which aided materially in holding the expenses to a minimum. Dairy products, calves, colts, wool and lambs, hogs, poultry, and general crops were produced upon this farm. All these enterprises brought in some revenue, the largest single source being cattle. The total gross farm income was $2,223. No colts or lambs were sold, the increases being kept on the farm to increase the size of the business for the coming year. No outside labor was hired, and the single item of largest expense was $400 for family labor. Deducting expenses, a net income of

$1,550 was left, of which $1,159 was the operator's labor income for his year's work, which is a very successful showing under the conditions existing in this area.

This farm was so organized that the farmer could pay his family labor for the work performed, pay interest on investment, and at the same time be well paid for his own year's work.

FARM NO. 5.

DISTRIBUTION OF FARM AREA.

Crop area	acres	67
Woods and waste	do	293
Pasture	do	70
Rented out	do	10
Total farm area	do	440

DISTRIBUTION OF CAPITAL.

Land and buildings	$4,000
Live stock	2,170
Machinery	643
Feed and cash	590
Total capital	7,403

ACREAGE AND YIELD OF CROPS.

Crop.	Total yield.	Acres.
Corn, bushels	700	20
Wheat, do	300	17
Hay, tons	10	15
Millet hay, do	4	3
Alfalfa, do	13	7
Apples, bushels	400	4
Garden		1
Peas[1], bushels	8	2

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	12		
Heifers	3		
Calves	8	2	14
Bull	1		
Steers	15		
Horses	5		
Colts	1		1
Brood sows	4		
Hogs	5		31
Poultry	78		99

DISTRIBUTION OF RECEIPTS.

Source.	Amount sold.	Value.
Wheat, bushels	225	$428
Apples, do	400	400
Hay, tons	2	40
Corn, bushels	200	350
Dairy products		76
Cattle		850
Colts		60
Hogs		342
Poultry and eggs		136
Total receipts		2,682

DISTRIBUTION OF EXPENSES.

Hired labor	$105
Family labor	396
Repairs to machinery	50
Repairs to buildings and fences	90
Feed	49
Seed	86
Fertilizer	72
Other expenses	153
Depreciation, buildings and machinery	88
Total expenses	1,089

[1] Second crop.

Farm income (difference between receipts and expenses)	$1,593
5 per cent interest on capital	370
Labor income	1,223

This was perhaps the most successfully operated of all the hilly-upland farms from which records were obtained, and in this connection it is interesting to note that when this operator moved to the farm 20 years ago he bought it from a man who had made a failure of its operation.

The present operator has taken in more land than was under cultivation when he first bought it and has expended an immense amount of work in picking up and hauling stones off the place. For hay he had 15 acres of meadow, 7 acres of alfalfa, and 3 acres of millet. Two acres of cowpeas were planted in the apple orchard. The other crops consisted of 20 acres of corn and 17 acres of wheat. The live stock consisted of 12 cows, 15 feeding steers, 5 horses, 1 colt, 4 brood sows, and other young

stock, and a flock of chickens. No live stock was lost during the year. He has for years practiced a regular system of crop rotation and pasturage and the use of stable manure on his land, and good yields were obtained. He also cultivates and sprays his apple orchard carefully and obtains good yields. Apple sales of $400, wheat $428, and net sales of cattle amounting to $850 were his largest sources of cash receipts. Hogs contributed $342 to the farm income. Revenue was also obtained from the sale of dairy products, raising colts, poultry, and other sources.

The gross farm income amounted to $2,682, total expenses of $1,089 deducted from this left a net income of $1,593, of which $1,223 was the operator's labor income for his year's work.

FARM NO. 6.

DISTRIBUTION OF FARM AREA.

Crop area	acres	37
Waste and woods	do	19
Pasture	do	21
Total farm area	do	77

DISTRIBUTION OF CAPITAL.

Land and buildings	$5,000
Live stock	626
Machinery and tools	160
Feed and cash	64
Total capital	5,850

ACREAGE AND YIELD OF CROPS.

Crop.	Total yield.	Acres.
Corn, bushels	375	8
Wheat, do	100	10
Oats, do	230	10.5
Barley, do	65	3.5
Hay, do	2	2
Apples	.....	3

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	3	.....	.....
Bull	1	.....	.....
Heifer	1	.....	.....
Calves	2	.....	4
Horse	7	.....	.....
Colts	.....	.....	6
Boars	1	1	.....
Brood sows	2	.....	.....
Hogs	6	8	15
Chickens	45	.....	18

DISTRIBUTION OF RECEIPTS.

Source.	Amount sold.	Value.
Corn, bushels	54	$96
Oats, do	60	45
Wheat, do	50	95
Barley, do	2	4
Dairy products	.....	40
Cattle	.....	151
Colts	.....	215
Hogs	.....	268
Poultry and eggs	.....	34
Total receipts	.....	948

DISTRIBUTION OF EXPENSES.

Extra hired labor	$12
Family labor	150
Repairs to machinery	10
Repairs to fences	10
Feed	160
Seed	18
Other expenses	124
Depreciation, machinery and buildings	40
Total expenses	524

Farm income (difference between receipts and expenses)	$424
5 per cent interest on capital	292
Labor income	132

This farm of 77 acres had live stock at the beginning of the year consisting of 3 cows; 4 calves, yearlings, and heifers; 7 mares, 2 sows and 7 other hogs. There were 8 acres of corn and 24 acres of wheat, oats, and barley; 2 acres of hay, and 21 acres of pasture. Receipts from hogs were low. Some dairy products were sold. Six colts were born during the year but were of a small, inferior breed and of low value. Most of the crops raised were fed on the place, and, in addition, $160 was spent for feed. Feed produced by the combination of crops was not as great as could have been

obtained by planting more corn and forage crops, and returns from stock were not commensurate with the value of the feed consumed, especially from the great number of horses. This farm had for three years belonged to the present owner, who stated that at the outset he had $2,000 cash, in addition to that used in purchasing and equipping the farm, but had used this entire amount in addition to the farm returns for the three years' living. The year's analysis of the business shows quite clearly why this was necessary. His horse enterprise is large and unprofitable.

FARM NO. 7.

DISTRIBUTION OF FARM AREA.

Crop area	acres	56
Waste and woods	do	109
Pasture	do	35
Total farm area	do	200

DISTRIBUTION OF CAPITAL.

Land and buildings	$9,500
Live stock	1,761
Machinery and tools	505
Cash	100
Total capital	11,866

ACREAGE AND YIELD OF CROPS.

	Total yield.	Acres.
Corn, bushels	200	4
Corn and soy beans for silage, tons	100	10
Wheat, bushels	96	10
Rye, do	32	4
Rye (pastured)	.....	4
Oats, bushels	128	4.5
Kafir corn (seed), do	10	2
Hay, tons	4	5
Soy beans, do	15	6
Sorghum, gallons	40	1.5
Cane after oats, do	10	4.5
Apples	.....	4
Blackberries, crates	44	1

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	10	.....	.....
Heifers	9	.....	.....
Calves	.....	.....	13
Bulls	1	¼	.....
Horses	3	.....	.....
Mules	1	.....	.....
Mule colt	1	.....	.....
Boar	1	.....	.....
Brood sows	2	.....	.....
Hogs	7	.....	19
Chickens	125	.....	86

DISTRIBUTION OF RECEIPTS.

Source.	Amount sold.	Value.
Wheat, bushels	80	$160
Rye, do	2	4
Oats, do	40	30
Hay, tons	4	48
Blackberries, crates	41	43
Dairy products	.....	658
Cattle	.....	374
Colts	.....	25
Hogs	.....	252
Poultry and eggs	.....	118
Wood	.....	12
Total receipts	.....	1,724

DISTRIBUTION OF EXPENSES.

Hired labor	$40
Family labor	500
Repairs to machinery	22
Repairs to fences	7
Feed	212
Seed	46
Other expenses	166
Depreciation, machinery, and buildings	120
Total expenses	1,113

Farm income (difference between receipts and expenses)	$611
5 per cent interest on capital	593
Labor income	18

This farm had an improved area of 91 acres. The stock on hand at the beginning of the year consisted of 10 cows, 9 heifers, and 1 bull; three horses, 1 mule, and 1 colt; 2 sows and 8 other hogs, and a flock of chickens. Fifty-six acres of crops were raised and good yields obtained.

This represents one of the farms where dairying receives considerable attention. When the present operator purchased this farm, six years ago, it was in a badly run-down condition, and his good management in inaugurating a cropping system and

the dairy industry has been the means of building up the farm until he now gets yields far above the average of the region. He covers 14 acres a year with 7 tons of manure per acre. The cows of a dairy herd were kept for dairy purposes (steer calves not being raised), and consumed most of the feed raised on the place. In addition, $213 worth of feed was bought. The average annual production of butter fat per cow was only 130 pounds, an inadequate return for the feed consumed. In consequence, as the capital investment was rather high, a labor income of only $18 was earned by the operator. Increasing the production of the dairy cows is of prime importance on this farm.

FARM NO. 8.

DISTRIBUTION OF FARM AREA.

Crop area	acres	52
Woods and waste	do	25
Pasture	do	43
Total farm area	do	120

DISTRIBUTION OF CAPITAL.

Land and buildings	$7,800
Live stock	1,812
Machinery and tools	986
Cash	200
Total capital	10,798

ACREAGE AND YIELD OF CROPS.

Crop.	Total yield.	Acres.
Corn, bushels	800	20
Wheat, do	230	10
Oats, do	160	4
Hay, tons	16.5	11
Alfalfa, do	2	2
Apples		2
Peaches		1
Garden		2

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	9		
Heifers	4		
Steers	4		
Calves	8		12
Bulls	1		
Horses	3		
Colts	1		1
Sheep	9		
Lambs	11		11
Brood sows	2		
Hogs			24
Chickens	100		50

DISTRIBUTION OF RECEIPTS.

Source.	Amount sold.	Value.
Corn, bushels	100	$150
Wheat, do	180	360
Oats, do	25	23
Hay, tons	1	27
Dairy products		658
Cattle		455
Colts		65
Sheep and wool		217
Hogs		797
Poultry		255
Total receipts		3,007

DISTRIBUTION OF EXPENSES.

Hired labor	$44
Family labor	600
Repairs to machinery	50
Repairs to buildings	75
Feed	100
Seed	38
Fertilizer	54
Other expenses	92
Depreciation, building, and machinery	105
Total expenses	1,158

Farm income (difference between receipts and expenses)	$1,840
5 per cent interest on capital	549
Labor income	1,309

This farm contained 95 acres of improved land. It is interesting to compare this farm with farm No. 7 as to crop area, size of business, and returns. The stock on hand at the beginning of the year consisted of 9 cows and 17 head of other cattle, 3 horses, and a colt, 2 brood sows, 20 sheep and lambs, and a flock of chickens. Manure was saved

and applied carefully, and a 3-to-4-year rotation followed. Most of the crops raised, except the wheat, were fed on the place. All calves were raised. Two litters of pigs were raised from 1 sow, one litter from the other sow, and the sale of these pigs furnished an especially good source of income. Income was derived from all other classes of live stock kept, with over 20 per cent of the total receipts from sales of crops. Both a good farm income and labor income were earned. The family labor on this farm, valued at $600, was done by the operator's daughters, who found the work both profitable and pleasant. (See Fig. 17.) This farm is well organized and unusually well diversified.

FARM NO. 9.

DISTRIBUTION OF FARM AREA.

Crop area	acres	122
Woods and waste	do	98
Pasture	do	91
Total farm area	do	311

DISTRIBUTION OF CAPITAL.

Land and buildings	$10,260
Live stock	3,153
Machinery and tools	673
Feed and cash	376
Total capital	14,462

ACREAGE AND YIELD OF CROPS.

Crop.	Total yield.	Acres.
Corn (bushels)	1,155	33
Wheat (do)	385	29
Oats (do)	300	12
Hay (tons)	20	30
Cowpeas (hogged)		12
Orchard, garden, etc.		6

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	13		
Steers	8		
Heifers	9		
Calves			13
Horses	4		
Mules	2		
Colts	3		2
Ewes	29		
Lambs			23
Brood sows	4		
Hogs	43		44

DISTRIBUTION OF RECEIPTS.

Source.	Amount sold.	Value.
Corn		$329
Winter wheat (bushels)	295	561
Hay (tons)	1	12
Dairy products		150
Cattle		372
Colts		140
Sheep and wool		466
Hogs		915
Poultry and eggs		40
Total receipts		2,985

DISTRIBUTION OF EXPENSES.

Hired labor	$20
Family labor	180
Repairs to machinery	35
Repairs to building and fences	33
Seed	32
Fertilizer	60
Other expenses	111
Depreciation, buildings and machinery	107
Total expenses	578

Farm income (difference between receipts and expenses)	$2,407
5 per cent interest on capital	723
Labor income	1,684

This is a relatively large farm, containing 213 acres of improved land. The live stock at the beginning of the year consisted of 13 cows and 23 other cattle; 6 horses and mules, 3 colts; 29 sheep and lambs; 4 brood sows and 43 pigs. The sale of hogs constituted the chief source of income, followed in the order named by sale of crops, sheep, cattle, dairy products, colts, and poultry. Among the crops were 12 acres of cowpeas hogged off. Wheat was the important cash crop. The farm income and labor income earned were very satisfactory.

FARM NO. 10.

DISTRIBUTION OF FARM AREA.

Crop area	acres	90
Woods and waste	do	17
Pasture	do	85
Total farm area	do	192

DISTRIBUTION OF CAPITAL.

Land and buildings	$6,000
Live stock	3,331
Machinery and tools	474
Feed and cash	340
Total capital	10,145

ACREAGE AND YIELD OF CROPS.

Crop.	Total yield.	Acres.
Corn, bushels	900	25
Wheat, do	238	17
Oats, do	290	9
Hay, tons	15	30
Millet hay, do	5	7
Garden	.....	2

NUMBER OF LIVE STOCK.

Class.	Beginning of year.	Purchased.	Produced.
Cows	11	2	.....
Heifers	7	.....	.....
Calves	7	.....	11
Bulls	1	1	.....
Steers	2	.....	.....
Horses	4	1	.....
Mules	4	1	.....
Colts	2	.....	2
Sheep	28	.....	.....
Lambs	34	.....	21
Brood sows	3	1	.....
Hogs	10	.....	16
Chickens	80	.....	75

DISTRIBUTION OF RECEIPTS.

Source.	Amount sold.	Value.
Corn, bushels	425	$520
Wheat, do	138	276
Oats, do	70	42
Dairy products	.....	260
Cattle	.....	543
Horses, mules, and stallion fees	.....	845
Sheep and wool	.....	575
Hogs	.....	191
Poultry and eggs	.....	282
Total receipts	.....	3,534

DISTRIBUTION OF EXPENSES.

Hired labor	$300
Family labor	300
Repairs to machinery	40
Repairs to buildings and fences	30
Feed	60
Seed	28
Fertilizer	23
Other expense	193
Depreciation, building and machinery	85
Total expenses	1,059

Farm income (difference between receipts and expenses)	$2,475
5 per cent interest on capital	507
Labor income	1,968

The operator of this farm carried on a considerable live-stock business, as is shown by the number and value of stock on hand at the beginning of the year. In addition, he bought a few more cattle, horses, and hogs during the year. Horses and mules afforded his chief source of income. Over 40 per cent of the total investment was in working capital. Income was contributed by all classes of stock, and corn, wheat, and oats were sold to the extent of $838. This farm was in a section with an abundance of free range pasture.

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